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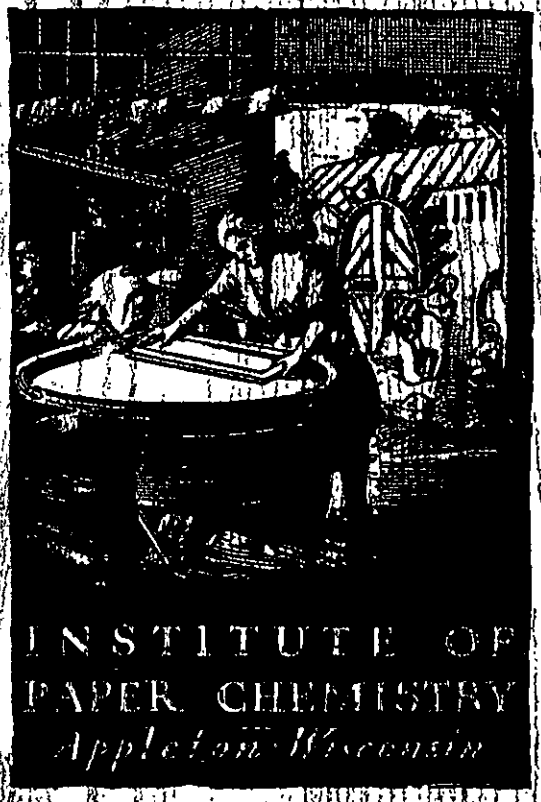

CONTINUOUS BASELINE STUDY

Project 1108-13

Summary Report

to

FOURDRINIER KRAFT BOARD INSTITUTE, INC.

April 1, 1956

THE INSTITUTE OF PAPER CHEMISTRY

Appleton, Wisconsin

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This report presents a summary of the results obtained in conjunction with the Continuous Baseline Study from April 1, 1955, to March 31, 1956--a period of twelve months--and is supplementary to a similar report dated April 1, 1955. The duration of each reported period as well as the total number of samples submitted is given in Table I, and the number of samples submitted by each mill for each of the reported periods is shown in Table II. Also shown in Table II is the total and average number of samples submitted by each mill for the twelve periods.

As mentioned above, previous summary reports have presented data for the first 93 periods of the Continuous Baseline Study. It may be recalled that during the first 93 periods, the current F.K.I. averages for basis weight oscillated near the 43-lb. level. It may be seen in Table III and Figure 1 that during the interim from periods 94 to 105, basis weight values have remained close to the 43-lb. level also.

The current F.K.I. caliper averages exhibited a definite trend downward during the first 41 periods, from a high of 15.6 points for the first period to a low of 13.4 points for the 41st period. Since then caliper has maintained a low level near 13 points. The current F.K.I. caliper averages are continuing to maintain a level slightly below 13 points.

The first 36 periods of the Continuous Baseline Study witnessed a substantial rise in bursting strength results. A decline was

noted during periods 37 to 49. Bursting strength values with a few exceptions maintained a level near 110 p.s.i.g. during periods 50 to 84. Since then this same level has been maintained as may be noted in Table III and Figure 1.

TABLE I

DURATION OF REPORTED PERIODS AND NUMBER OF 42-LB. KRAFT LINERBOARD SAMPLES PER PERIOD

Period	Duration	Number of Samples
94	April 1 through April 30, 1955	106
95	May 1 through May 31, 1955	120
96	June 1 through June 30, 1955	107
97	July 1 through July 31, 1955	88
98	August 1 through August 31, 1955	128
99	September 1 through September 30, 1955	122
100	October 1 through October 31, 1955	102
101	November 1 through November 30, 1955	112
102	December 1 through December 31, 1955	113
103	January 1 through January 31, 1956	113
104	February 1 through February 29, 1956	104
105	March 1 through March 31, 1956	103
	Average	109.8

TABLE II

TABULATION BY PERIODS OF THE NUMBER OF SAMPLES OF 42-LB. KRAFT LINERBOARD SUBMITTED BY EACH MILL

	Periods												
Mills	94	95	96	97	98	99	100	101	102	103	104	105	Av.
A	9	7	4	3	7	8	4	6	4	5	5	4	5.5
B	3	9	3	6	3	11	12	2	8	11	3	4	6.2
C	4	4	6	4	6	6	6	4	6	4	6	6	5.2
D	4	3	3	2	4	4	2	4	2	3	2	3	3.0
E	4	6	8	7	7	8	6	7	8	10	9	9	7.4
F	8	10	6	8	10	10	10	6	10	10	6	10	8.7
G	5	5	5	5	3	5	3	3	4	5	5	1	4.1
H	8	15	14	14	14	14	6	15	10	6	11	8	11.2
I	7	5	6	6	16	6	16	9	12	10	9	9	9.2
J	16	24	8	3	12	7	6	7	4	8	6	7	9.0
K	8	8	8	8	8	8	8	8	8	8	8	8	8.0
L	4	3	5	1	3	4	2	2	3	2	3	5	3.1
M	6	7	9	1	8	2	6	11	8	7	7	10	6.8
N	1	1	4	0	4	3	1	7	4	0	1	1	2.2
O	6	5	4	2	4	4	4	5	6	6	5	4	4.6
P	10	6	6	8	12	10	6	8	6	10	8	6	8.0
Q	3	2	8	10	7	12	4	8	10	8	10	8	7.5
Total	106	120	107	88	128	122	102	112	113	113	104	103	109.8

TABLE III

TABULATION OF CURRENT F.K.I. AVERAGES BY PERIODS

Period	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. g.	G. E. Puncture, units	Elmendorf Tear, g./sheet	
					In	Across
94	43.0	12.8	111	36	360	387
95	42.9	12.7	110	36	362	387
96	42.8	12.6	108	35	351	383
97	43.0	12.7	109	35	358	388
98	42.8	12.7	111	35	353	385
99	42.7	12.6	109	35	352	381
100	43.0	12.7	108		352	382
101	43.0	12.7	108		352	383
102	43.0	12.6	109		345	379
103	43.0	12.8	109		342	379
104	42.8	12.8	109		345	382
105	42.8	12.8	110		347	379

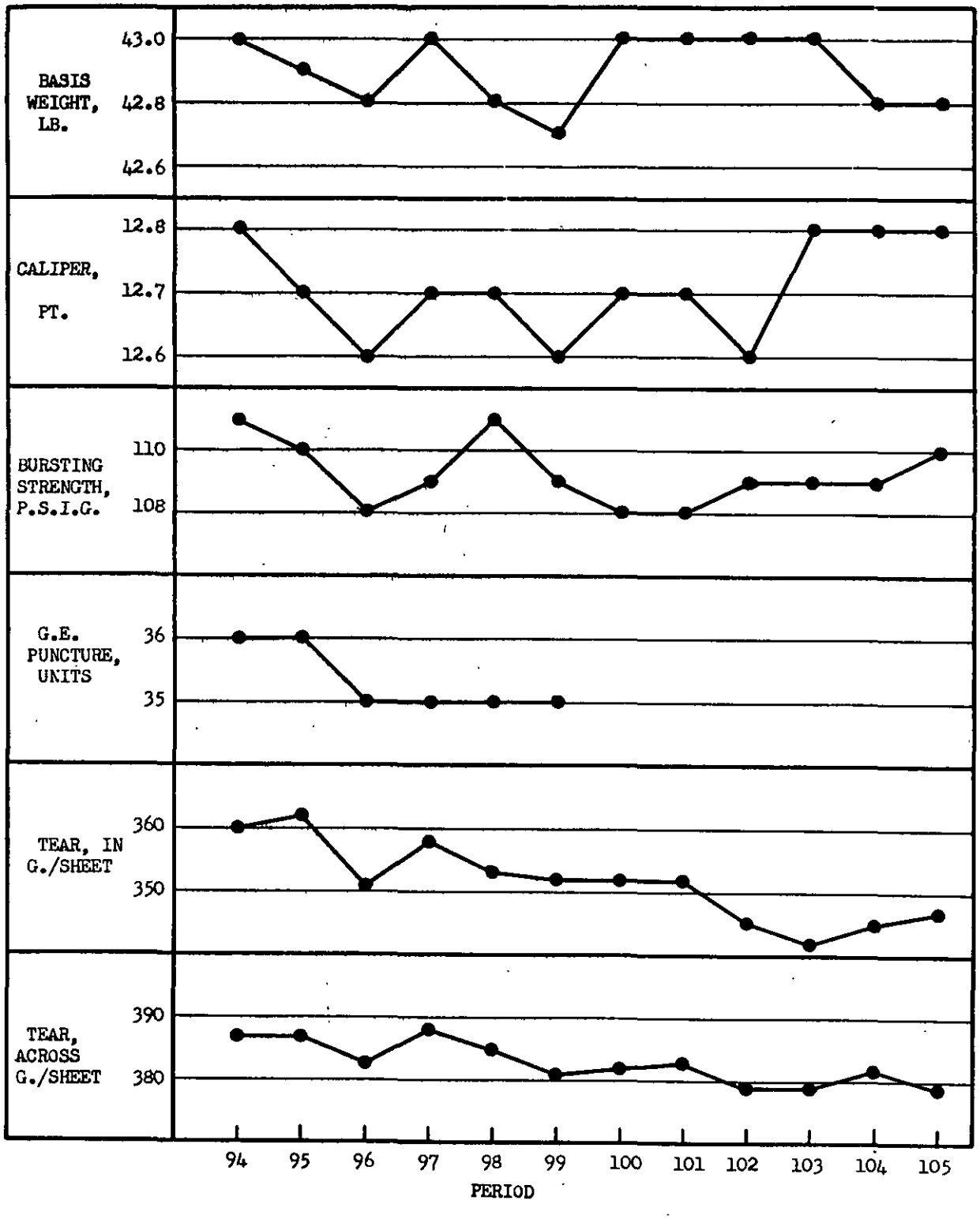


Figure 1

Comparison of Current F.K.I. Average by Periods

G. E. puncture values have exhibited a gradual decline from an average of 40 units at the inception of the Continuous Baseline Study to a low average of 33 units for the 72nd to 78th periods. Since that time, G. E. puncture values have maintained a level near 35 units. At the direction of the Fourdrinier Kraft Board Institute, the G. E. puncture test was discontinued at the conclusion of period 99.

Tearing strength during the first thirty-two periods was at a high level. However, since that time, there has been a gradual decline. It may be seen in Figure 1 that both machine and cross-machine direction tearing strength are currently at low levels, approximately 350 g./sheet for the machine direction and 380 g./sheet for the cross-machine direction.

The trends for the interim covered by periods 94 to 105 are the following:

1. Basis weight has remained relatively constant near the 43-lb. level.

2. Caliper has maintained a level slightly below 13 points.

3. Bursting strength has held a strong level near 110 p.s.i.g.

4. G. E. puncture was at a level of 35 units when it was discontinued at the conclusion of period 99.

5. Elmendorf tear has remained at a low level, approx. 350 g./sheet for the machine direction and 380 g./sheet for the cross-machine direction.

Table IV presents the current mill averages for Mill A for periods 94 to 105. The averages are shown graphically in Figure 2. It may be seen that Mill A's basis weight has maintained an average near 43 lb.;

TABLE IV

TABULATION OF CURRENT AVERAGES BY PERIODS FOR MILL A

Period	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. g.	G. E. Puncture, units	Elmendorf Tear, g./sheet In	Across
94	43.2	13.6	106	35	357	381
95	43.0	13.4	105	36	381	380
96	42.8	13.2	109	34	362	384
97	42.8	13.0	110	33	362	381
98	43.2	13.4	114	33	362	392
99	43.3	13.3	112	34	371	390
100	43.1	13.3	109		370	392
101	43.3	13.5	107		385	400
102	42.6	13.0	106		350	381
103	43.4	13.3	114		357	394
104	42.9	13.0	115		354	382
105	42.5	12.8	107		346	374

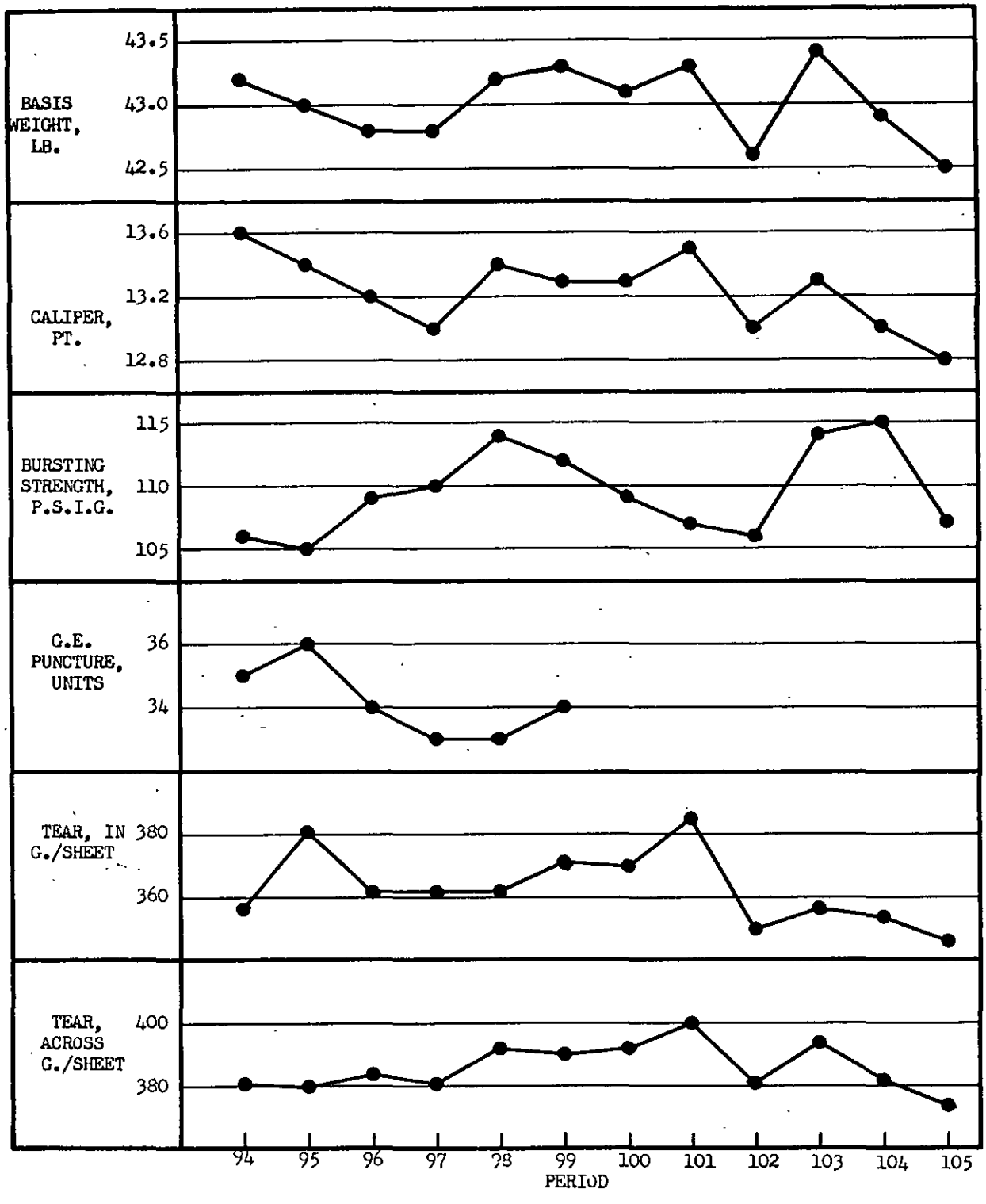


Figure 2

Comparison of Current Mill Averages by Periods for Mill A

caliper has held an average slightly above 13 points; bursting strength has varied randomly from a low of 105 to a high of 115 p.s.i.g. and G. E. puncture and Elmendorf tear have exhibited averages which are tantamount to the F.K.I. averages.

The current mill averages for Mill B, shown in Table V and graphically illustrated in Figure 3, indicates that the basis weight results have varied from a low value of 41.2 lb. to a high of 43.5 lb. with the majority of values near 42 lb. Caliper has decreased to a level slightly under 12 points. Bursting strength has been slightly below the F.K.I. average, whereas G. E. puncture and Elmendorf tear have been considerably above the F.K.I. averages.

The current mill averages for the periods 94 to 105 are presented in Table VI for Mill C. A graphical presentation is given in Figure 4. Basis weight has been between 42.1 and 43.4 lb. for the twelve periods and is currently near 43-lb. Caliper was at a low of 12.3 points for the 100th period and at a high of 13.2 points for the 97th and 98th periods. The average for the 105th period was 12.9 points. Bursting strength has decreased from a high value of 119 p.s.i. g. for the 94th period to a low value of 105 p.s.i. g. for the 100th period, and the present level is near 110 p.s.i.g. as indicated by the value of 111 p.s.i. g. for the 105th period. Machine direction Elmendorf tear results have been somewhat higher than the F.K.I. average, whereas cross-machine tear results have been slightly lower. G. E. puncture has declined to a low value of 31 units when discontinued at the conclusion of the 99th period.

Presented graphically in Figure 5 are the current Mill averages shown in Table VII for Mill D. The following trends are evident from the

TABLE V

TABULATION OF CURRENT AVERAGES BY PERIODS FOR MILL B

Period	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. g.	G. E. Puncture, units	Elmendorf Tear, g./sheet In	Across
94	43.2	13.1	109	41	396	428
95	42.4	12.5	103	40	399	431
96	42.5	12.9	107	38	387	424
97	43.5	13.5	108	39	400	436
98	43.2	13.2	110	38	390	427
99	42.5	12.6	108	37	393	418
100	42.3	11.9	108		377	409
101	41.2	11.6	106		349	371
102	42.1	11.6	107		376	404
103	42.6	11.7	105		374	415
104	42.8	11.9	103		380	421
105	42.4	11.9	108		372	408

TABLE VI

TABULATION OF CURRENT AVERAGES BY PERIODS FOR MILL C

Period	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. g.	G. E. Puncture, units	Elmendorf Tear, g./sheet	
					In	Across
94	42.6	12.8	119	36	389	386
95	42.5	12.6	115	33	376	370
96	42.5	12.7	111	34	363	380
97	42.6	13.2	117	34	375	382
98	42.5	13.2	111	33	358	368
99	42.1	12.5	107	31	362	357
100	42.8	12.3	105		354	361
101	42.8	12.8	109		374	374
102	43.2	12.4	111		359	372
103	42.8	12.8	107		367	366
104	43.4	12.8	108		384	373
105	42.7	12.9	111		373	372

TABLE VII

TABULATION OF CURRENT AVERAGES BY PERIODS FOR MILL D

Period	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. g.	G. E. Puncture, units	Elmendorf Tear, g./sheet In	Across
94	44.3	13.5	105	41	397	405
95	43.8	13.0	108	38	392	406
96	43.1	12.7	103	37	381	385
97	43.7	12.7	104	38	413	398
98	42.7	12.6	103	36	374	378
99	43.6	13.0	103	38	388	392
100	44.5	13.6	104		410	415
101	44.3	13.2	102		415	424
102	45.0	13.6	112		406	406
103	43.9	13.6	105		376	382
104	44.0	13.1	100		390	386
105	43.6	13.1	101		411	388

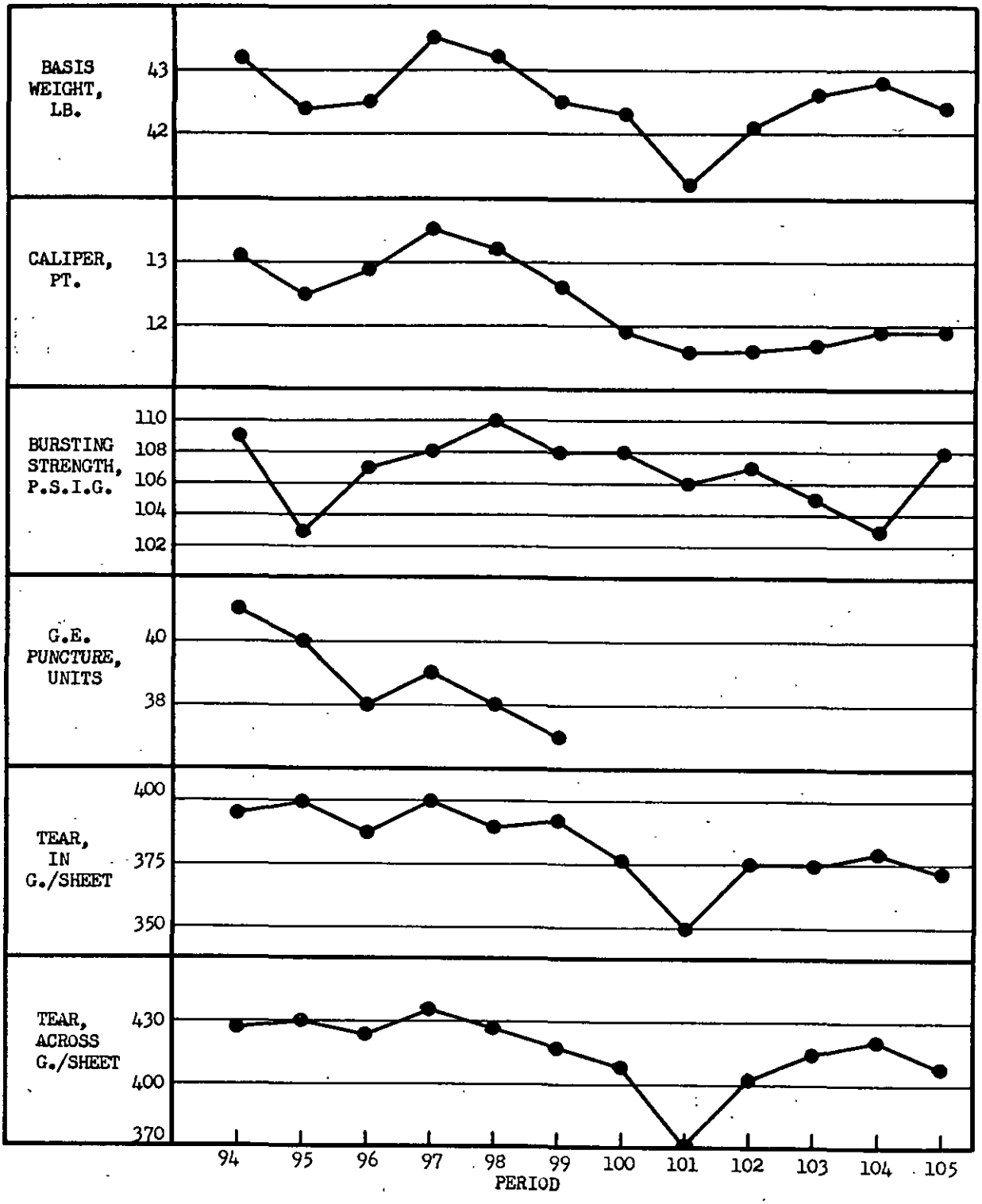


Figure 3

Comparison of Current Mill Averages by Periods for Mill B

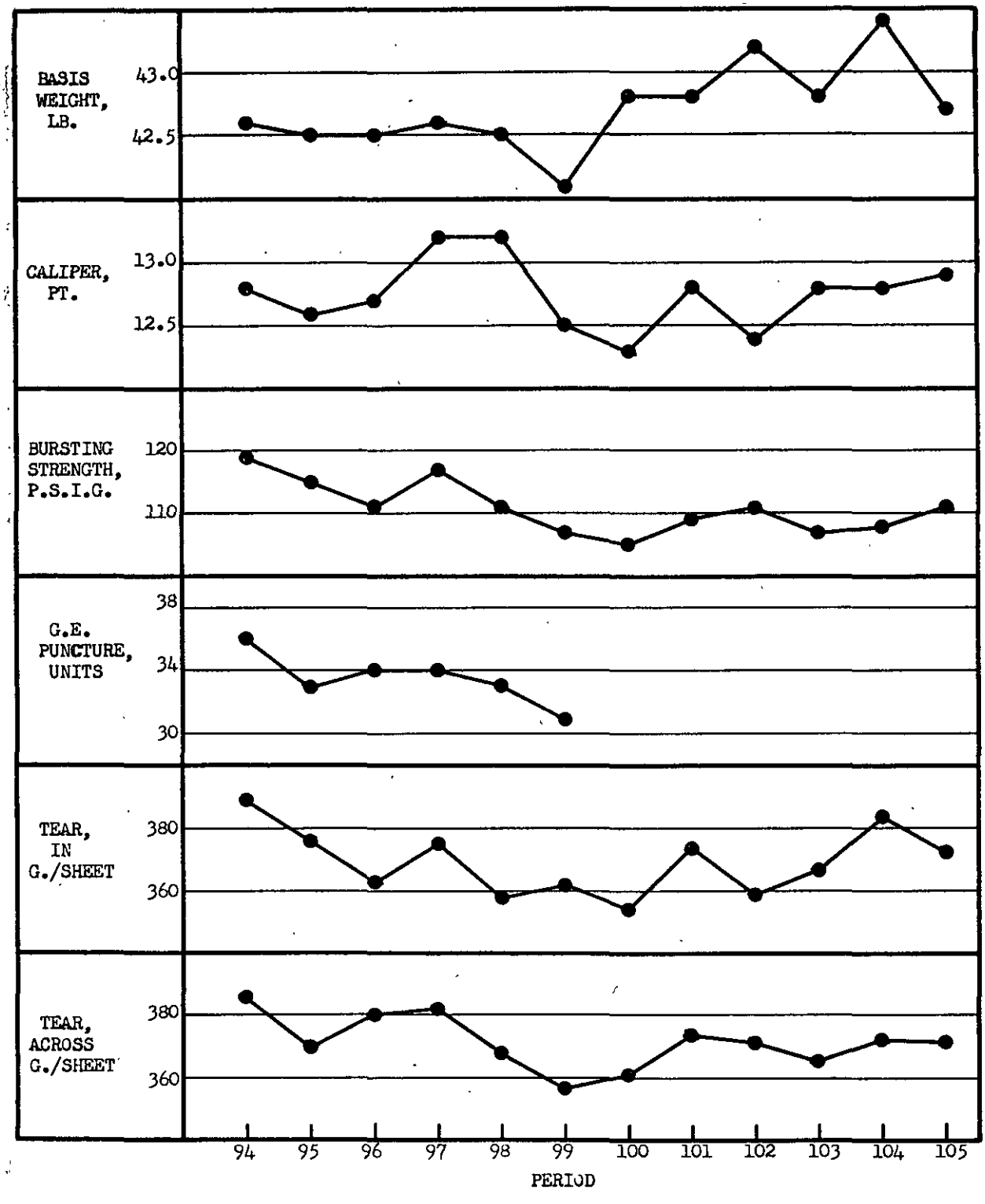


Figure 4

Comparison of Current Mill Averages by Periods for Mill C

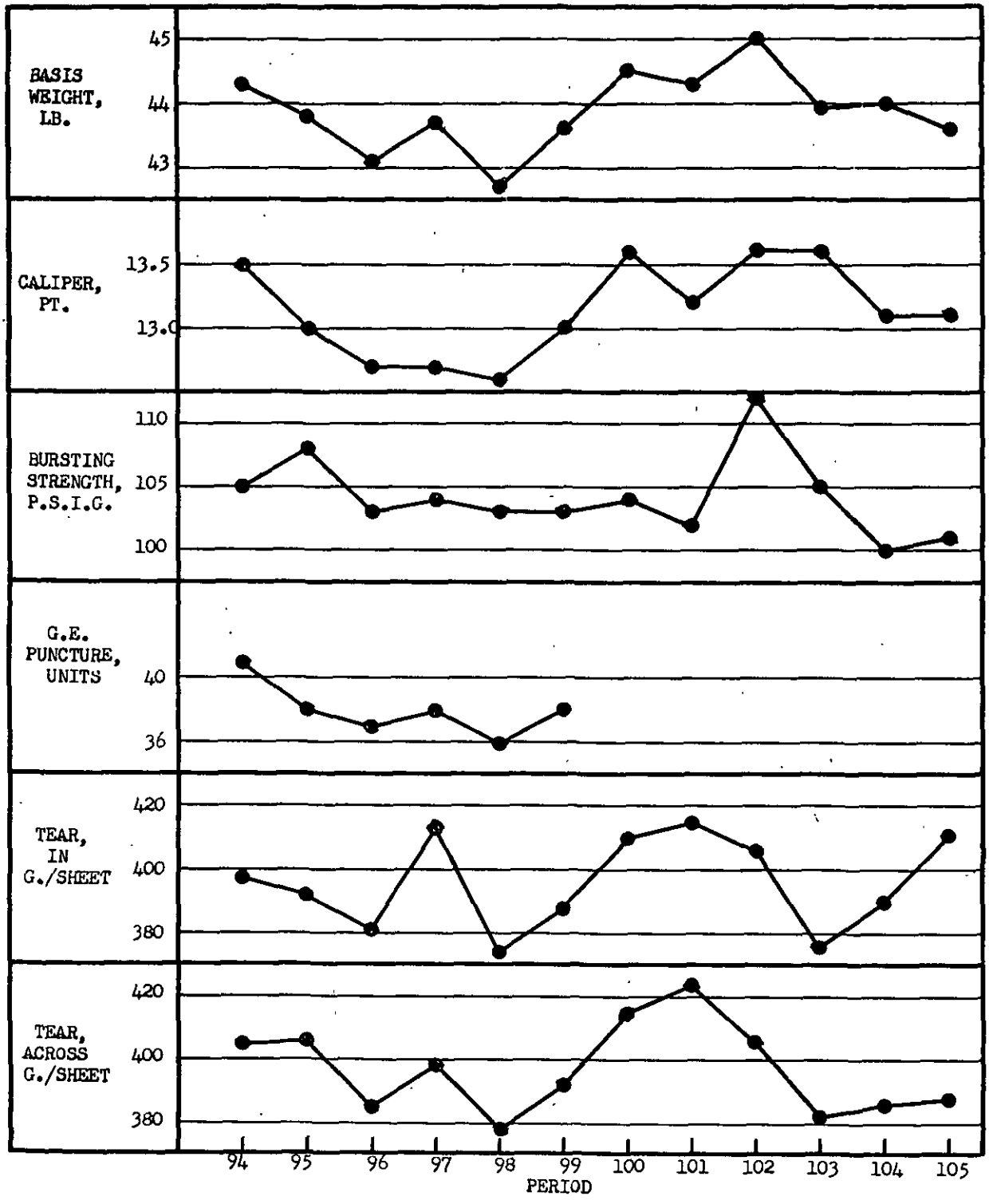


Figure 5

Comparison of Current Mill Averages by Periods for Mill D

data shown in Figure 5: (1) Basis weight has maintained an erratic level generally near 44 lb.;(2) caliper has varied from 12.6 to 13.6 points; (3) bursting strength has maintained a low level, generally slightly above 100 p.s.i.g.; (4) G. E. puncture averages were between 36 and 41 units; and (5) tear values were considerably above the F.K.I. averages.

The current mill averages for Mill E are shown in Table VIII, and a graphic presentation is given in Figure 6. It may be noted that the basis weight results have varied between 42.2 lb. and 44.0 lb. Caliper results have fluctuated between 11.9 and 13.2 points. Bursting strength has maintained a relatively strong level close to 110 p.s.i.g. G. E. puncture results have varied between 32 and 34 units. Elmendorf tearing strength results have exhibited machine direction values considerably below the F.K.I. level and cross-machine direction values comparable to the F.K.I. level.

Illustrated graphically in Figure 7 are the current mill averages shown in Table IX for Mill F. It is evident from the results shown in Table IX and Figure 7 that basis weight has generally been between 43 and 44 lb.; caliper has maintained a level near 12.5 points; bursting strength has maintained a level generally above 110 p.s.i.g.; G. E. puncture was maintaining a level near 35 units when it was discontinued. Machine-direction Elmendorf tear has been considerably below the F.K.I. average and cross-machine direction Elmendorf tear has been slightly lower for the past three periods.

The current mill averages for Mill G are shown in Table X and presented in graphic form in Figure 8. It may be seen in Figure 8 that

TABLE VIII

TABULATION OF CURRENT AVERAGES BY PERIODS FOR MILL E

Period	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. g.	G. E. Puncture, units	Elmendorf Tear, g./sheet In	Across
94	43.0	13.2	111	32	314	358
95	42.5	12.7	109	34	331	372
96	42.8	12.8	106	34	337	379
97	43.4	12.5	109	34	343	380
98	42.2	12.1	113	34	325	377
99	44.0	11.9	110	34	331	376
100	43.3	12.7	107		330	366
101	43.8	12.7	109		341	391
102	43.7	12.2	117		325	394
103	43.1	12.4	110		315	369
104	42.5	12.5	109		317	364
105	43.0	12.7	113		336	384

TABLE IX

TABULATION OF CURRENT AVERAGES BY PERIODS FOR MILL F

Period	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. g.	G. E. Puncture, units	Elmendorf Tear, g./sheet In	Across
94	43.3	12.7	112	37	360	400
95	43.2	12.5	113	36	350	396
96	43.6	12.5	112	35	345	383
97	43.0	12.4	112	35	350	384
98	43.5	12.7	114	36	342	388
99	43.1	12.7	111	35	334	383
100	43.6	12.5	118		334	391
101	44.0	12.7	115		339	397
102	43.6	12.4	114		332	383
103	43.1	12.4	112		321	373
104	43.3	12.6	109		321	375
105	43.0	12.6	111		322	368

TABLE X

TABULATION OF CURRENT AVERAGES BY PERIODS FOR MILL G

Period	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. g.	G. E. Puncture, units	Elmendorf Tear, In g./sheet In	Across
94	42.4	13.0	113	34	340	373
95	42.4	13.2	112	35	355	395
96	42.5	13.4	104	35	349	390
97	42.7	12.9	109	33	344	378
98	43.4	13.3	107	35	347	386
99	42.8	13.4	106	34	345	382
100	42.4	13.6	104		346	373
101	42.3	13.7	100		331	363
102	42.7	13.6	101		331	360
103	43.8	14.4	101		336	378
104	42.6	13.5	107		330	362
105	42.2	13.1	113		331	365

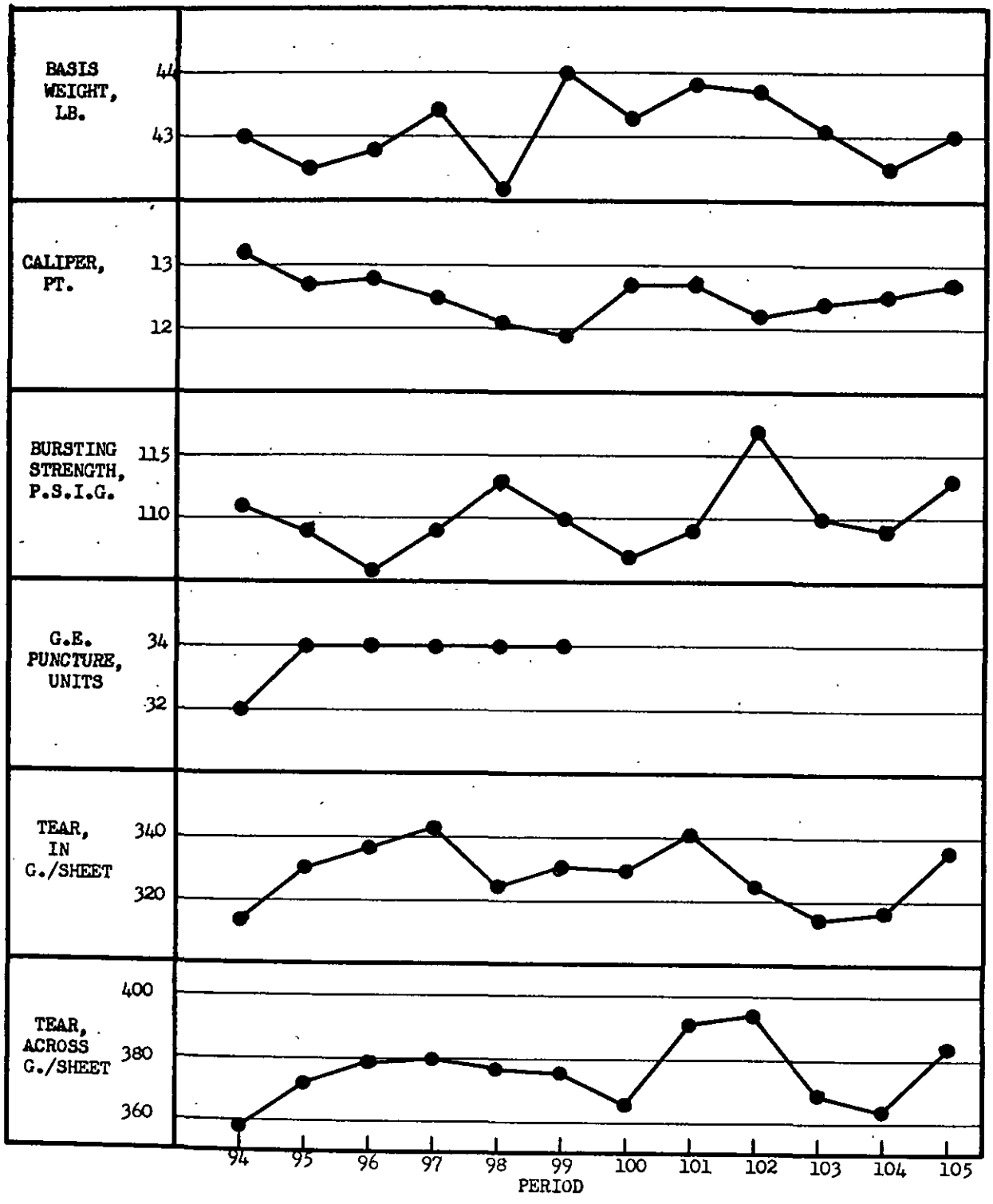


Figure 6

Comparison of Current Mill Averages by Periods for Mill E

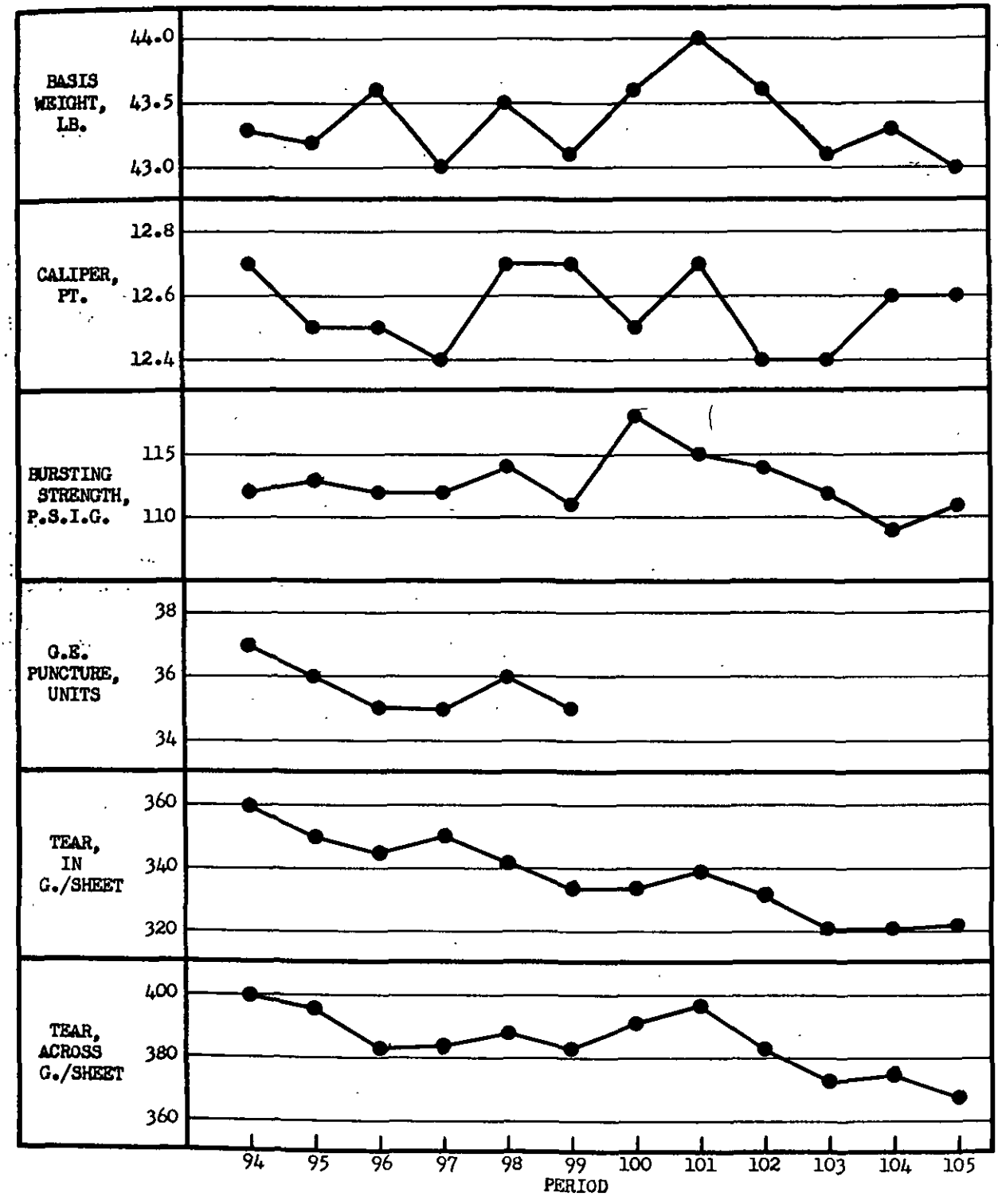


Figure 7

Comparison of Current Mill Averages by Periods for Mill F

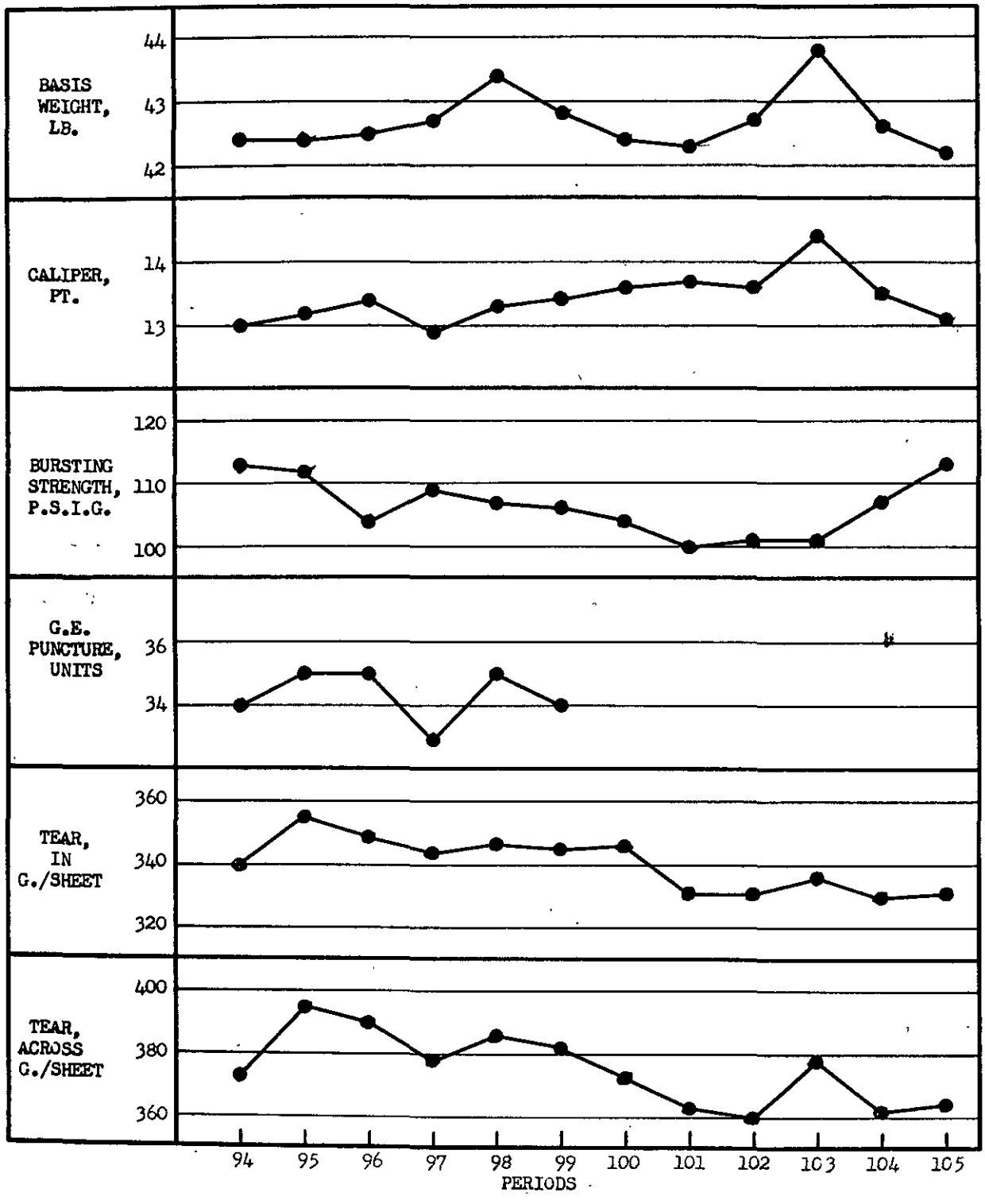


Figure 8

Comparison of Current Mill Averages by Periods for Mill G

basis weight values have fluctuated between 42.2 and 43.8 lb. Caliper has maintained a level between 12.9 and 14.4 points. Bursting strength has varied between 100 and 113 p.s.i. g., and G. E. puncture results held a low level of 34 units when the test was discontinued. Elmendorf tear results have also maintained levels which are lower than the F.K.I. averages.

The current mill averages for Mill H, which are shown in Table XI and presented graphically in Figure 9 exhibit the following levels: basis weight appears to have decreased somewhat to its current level near 43-lb.; caliper has been up and down and currently is 12.6 points; bursting strength has decreased from a high of 118 p.s.i. g. for the 95th period to the current level of 109 p.s.i. g.; G. E. puncture was maintaining a high level of 38 points when the test was discontinued. Machine direction and cross-machine direction Elmendorf tear have maintained levels slightly stronger than the F.K.I. level.

The current mill averages for Mill I presented in Table XII and illustrated graphically in Figure 10 show that basis weight has varied between 42.5 and 43.7 lb., no definite trend being evident; caliper has ranged from a low of 11.8 points for the 96th period to a high of 13.0 points for the 102nd period; bursting strength has maintained a level near 110 p.s.i.g. most of the time; the G. E. puncture level was 35 units at the time it was discontinued; and tearing strength has maintained a level somewhat above the F.K.I. average.

Pictured graphically in Figure 11 are the current mill averages shown in Table XIII for Mill J. It may be noted in

TABLE XI

TABULATION OF CURRENT AVERAGES BY PERIODS FOR MILL H

Period	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. g.	G. E. Puncture, units	Elmendorf Tear, g./sheet	
					In	Across
94	43.5	12.8	117	37	389	381
95	43.8	12.5	118	38	385	404
96	43.9	12.2	116	38	362	399
97	43.1	12.8	113	38	378	402
98	43.0	12.1	116	39	390	404
99	43.6	12.1	109	38	381	392
100	43.6	12.2	110		367	398
101	42.9	12.0	109		361	390
102	42.4	12.3	108		344	380
103	42.5	12.3	108		348	378
104	43.2	12.6	113		354	392
105	42.9	12.6	109		360	388

TABLE XII

TABULATION OF CURRENT AVERAGES BY PERIODS FOR MILL I

Period	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. g.	G. E. Puncture, units	Elmendorf Tear, g./sheet In	Across
94	43.0	12.5	115	37	377	396
95	43.7	12.0	107	37	372	388
96	43.4	11.8	108	37	369	385
97	42.6	12.0	109	35	340	395
98	43.6	12.4	110	35	351	385
99	43.3	12.2	112	35	360	393
100	43.3	12.5	109		354	384
101	43.4	12.7	112		351	395
102	43.0	13.0	109		353	386
103	43.3	12.8	111		343	382
104	42.5	12.9	108		355	385
105	43.6	12.5	111		361	397

TABLE XIII

TABULATION OF CURRENT AVERAGES BY PERIODS FOR MILL J

Period	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. g.	G. E. Puncture, units	Elmendorf Tear, g./sheet In	Across
94	42.9	12.5	109	33	296	354
95	42.8	12.0	120	32	304	364
96	42.6	12.2	106	30	304	341
97	43.4	12.1	111	31	314	371
98	42.8	12.5	112	31	317	361
99	42.4	12.2	115	30	301	350
100	43.4	12.2	114		323	365
101	43.8	12.6	118		328	376
102	42.7	11.8	118		303	355
103	42.6	11.9	119		307	354
104	42.7	11.9	118		312	365
105	43.0	12.0	117		317	369

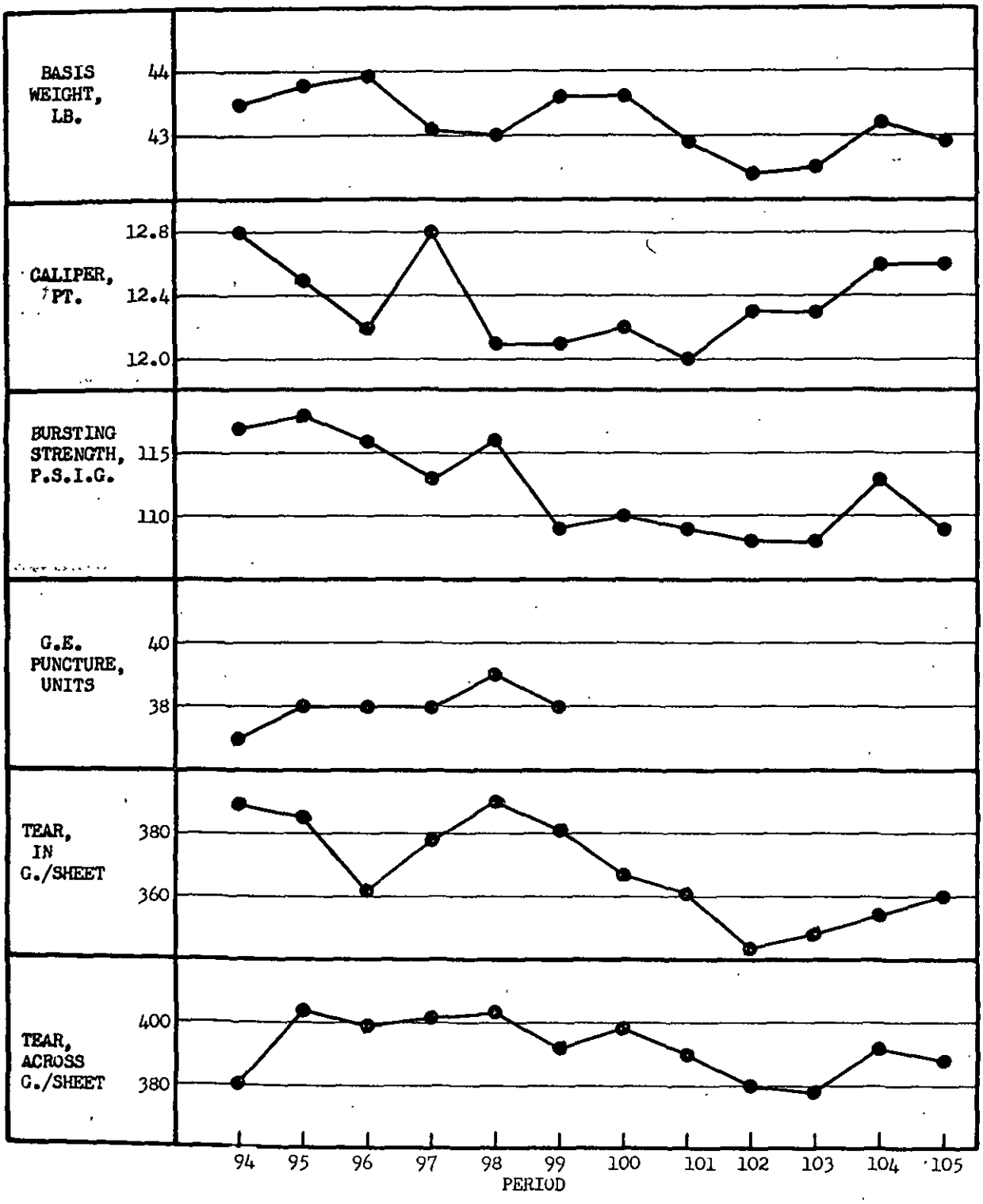


Figure 9

Comparison of Current Mill Averages by Periods for Mill H

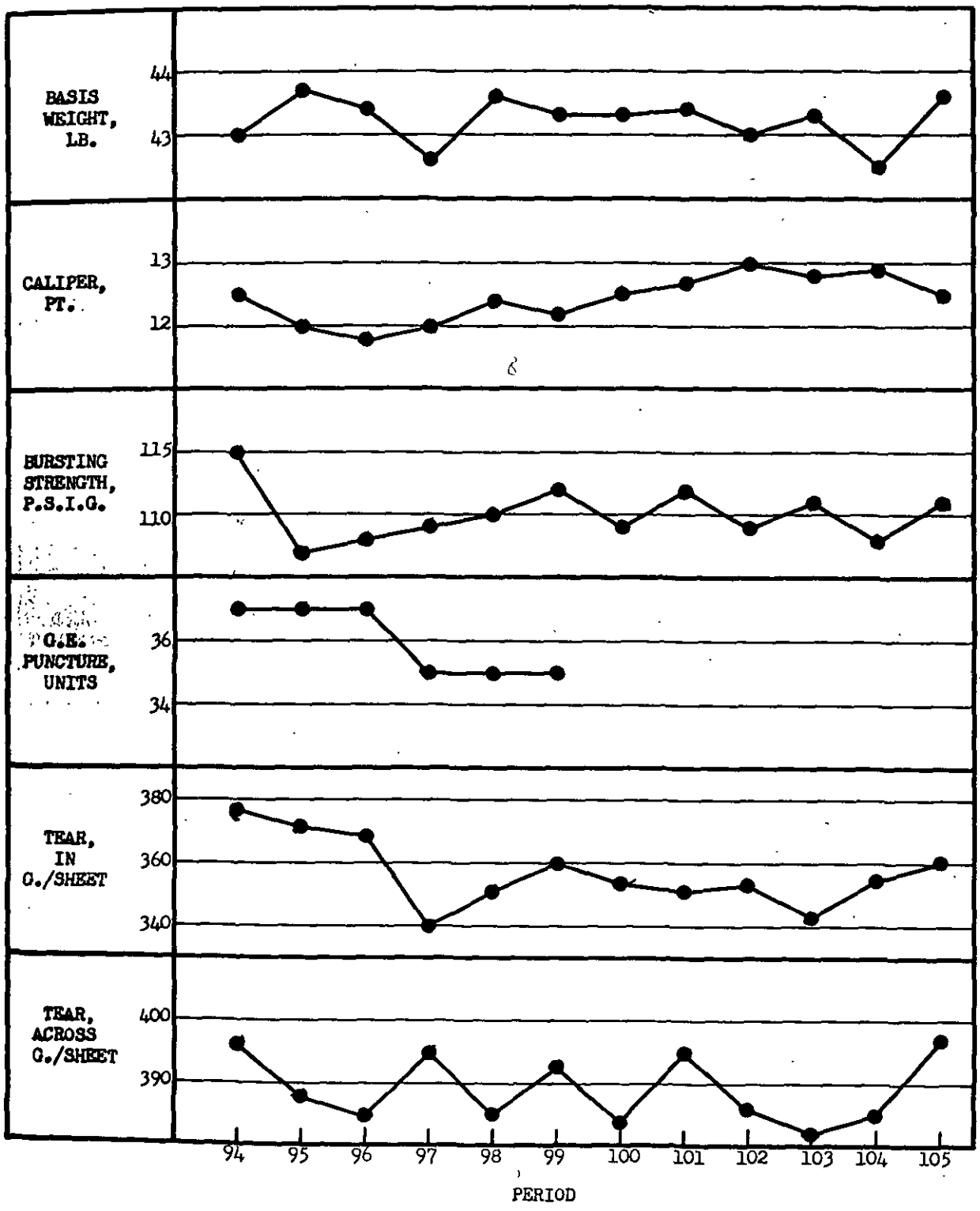


Figure 10

Comparison of Current Mill Average by Periods for Mill I

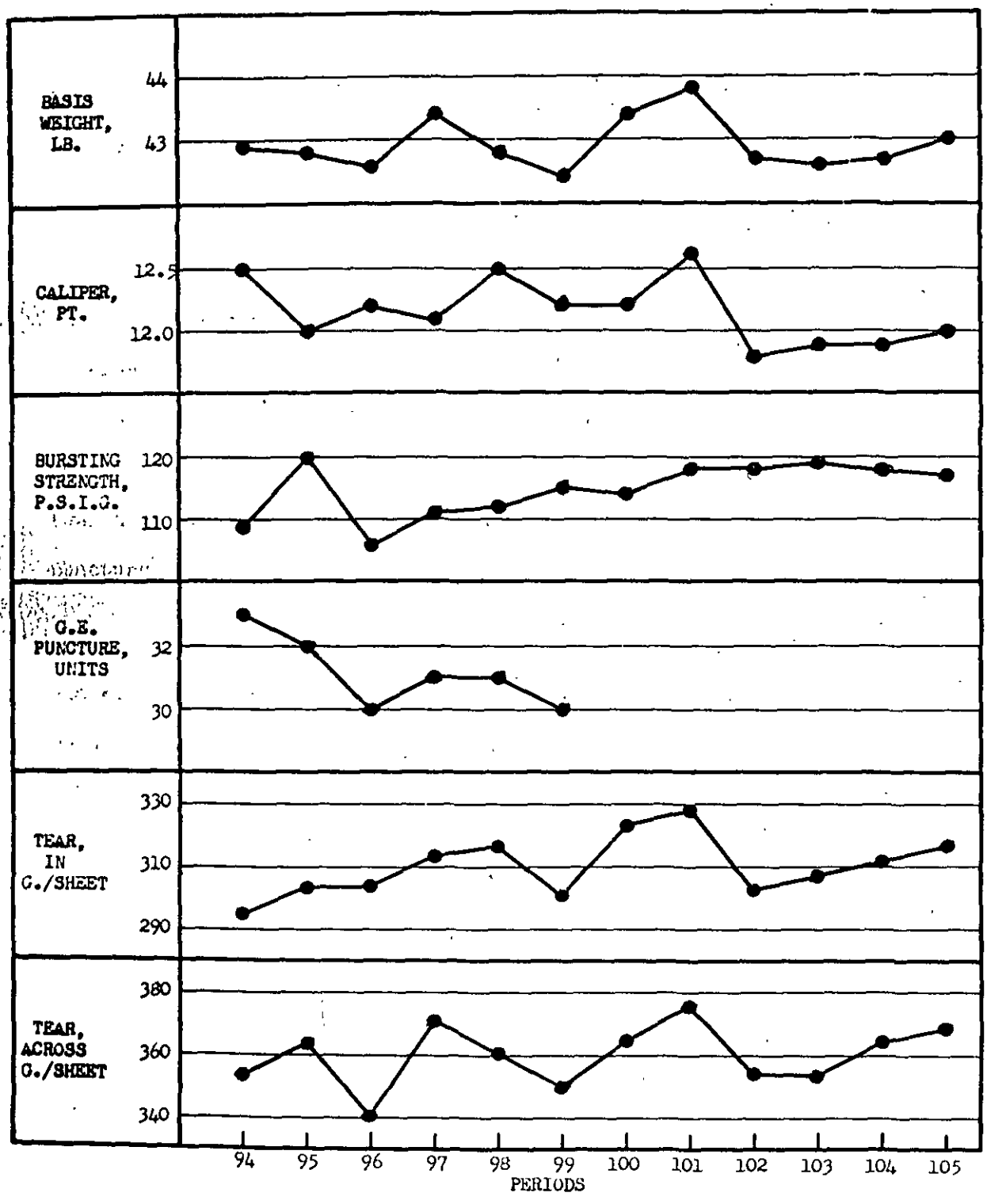


Figure 11

Comparison of Current Mill Averages by Periods for Mill J

Figure 11 that weight has fluctuated from a low of 42.4 lb. to a high of 43.8 lb.; caliper has been near 12 points; bursting strength has maintained a very strong level; G. E. puncture was at a low level of 30 points when discontinued, and Elmendorf tear has maintained a relatively constant but weak level.

The test averages for Mill K are shown in Table XIV and are plotted in Figure 12. It may be noted that weight has declined somewhat from a 44 lb. level to approximately 43 lb.; caliper has generally been confined to the 13.5 to 14.0 point area; bursting strength and Elmendorf tear have been somewhat lower than the F.K.I. averages whereas G. E. puncture was 35 units when discontinued at the conclusion of the 99th period.

The current mill averages for Mill L are presented in Table XV and pictured graphically in Figure 13. The following test levels are evident; weight between 41.6 and 43.3 lb.; caliper has been between 13.2 and 14.2 points; bursting strength has been generally between 104 and 108 p.s.i.g.; G. E. puncture values had decreased from 36 to 33 units when discontinued, whereas tearing strength values have shown a recent tendency toward levels considerably lower than the F.K.I. averages.

Shown graphically in Figure 14 are the current mill averages given in Table XVI for Mill M. Basis weight results have ranged between 40.7 and 43.2 lb.; caliper results between 12.0 and 12.6 points; bursting strength results between 102 and 109 p.s.i.g.; G. E. puncture results between 30 and 33 units, the final value being 31 units when the test was discontinued at the conclusion of the 99th period; Elmendorf tear results

TABLE XIV

TABULATION OF CURRENT AVERAGES BY PERIODS FOR MILL K

Period	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. g.	G. E. Puncture, units	Elmendorf Tear, g./sheet In	Elmendorf Tear, g./sheet Across
94	44.0	13.7	110	38	347	388
95	44.3	14.1	105	37	342	377
96	44.0	13.7	105	37	342	373
97	43.6	13.4	106	36	340	379
98	43.4	13.6	106	35	334	379
99	43.5	13.7	103	35	345	369
100	44.0	14.1	102		335	367
101	42.5	13.3	104		321	353
102	43.6	13.8	99		342	369
103	43.1	13.4	102		321	355
104	42.8	13.6	104		321	362
105	43.3	13.5	107		318	353

TABLE XV

TABULATION OF CURRENT AVERAGES BY PERIODS FOR MILL L

Period	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. g.	G. E. Puncture, units	Elmendorf Tear, g./sheet	
					In	Across
94	43.1	13.5	113	36	374	378
95	42.6	13.2	114	36	361	376
96	42.8	13.8	108	35	357	371
97	43.3	13.8	107	35	395	393
98	42.2	13.7	105	35	367	391
99	41.7	13.4	105	33	335	366
100	42.7	13.8	104		366	381
101	43.2	14.2	106		340	366
102	42.4	13.6	101		325	363
103	42.8	13.7	106		351	367
104	41.6	13.4	108		321	346
105	42.2	13.4	108		334	358

TABLE XVI

TABULATION OF CURRENT AVERAGES BY PERIODS FOR MILL M

Period	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. g.	G. E. Puncture, units	Elmendorf Tear, g./sheet In	Across
94	42.0	12.4	107	32	321	384
95	42.8	12.6	105	33	319	376
96	42.3	12.0	104	31	300	368
97	43.1	12.2	107	32	316	371
98	42.3	12.3	109	30	313	371
99	40.7	12.1	102	31	337	366
100	42.3	12.2	107		292	348
101	43.2	12.1	105		321	364
102	42.9	12.1	106		307	364
103	43.1	12.5	108		316	381
104	42.7	12.6	107		317	379
105	42.5	12.3	108		297	367

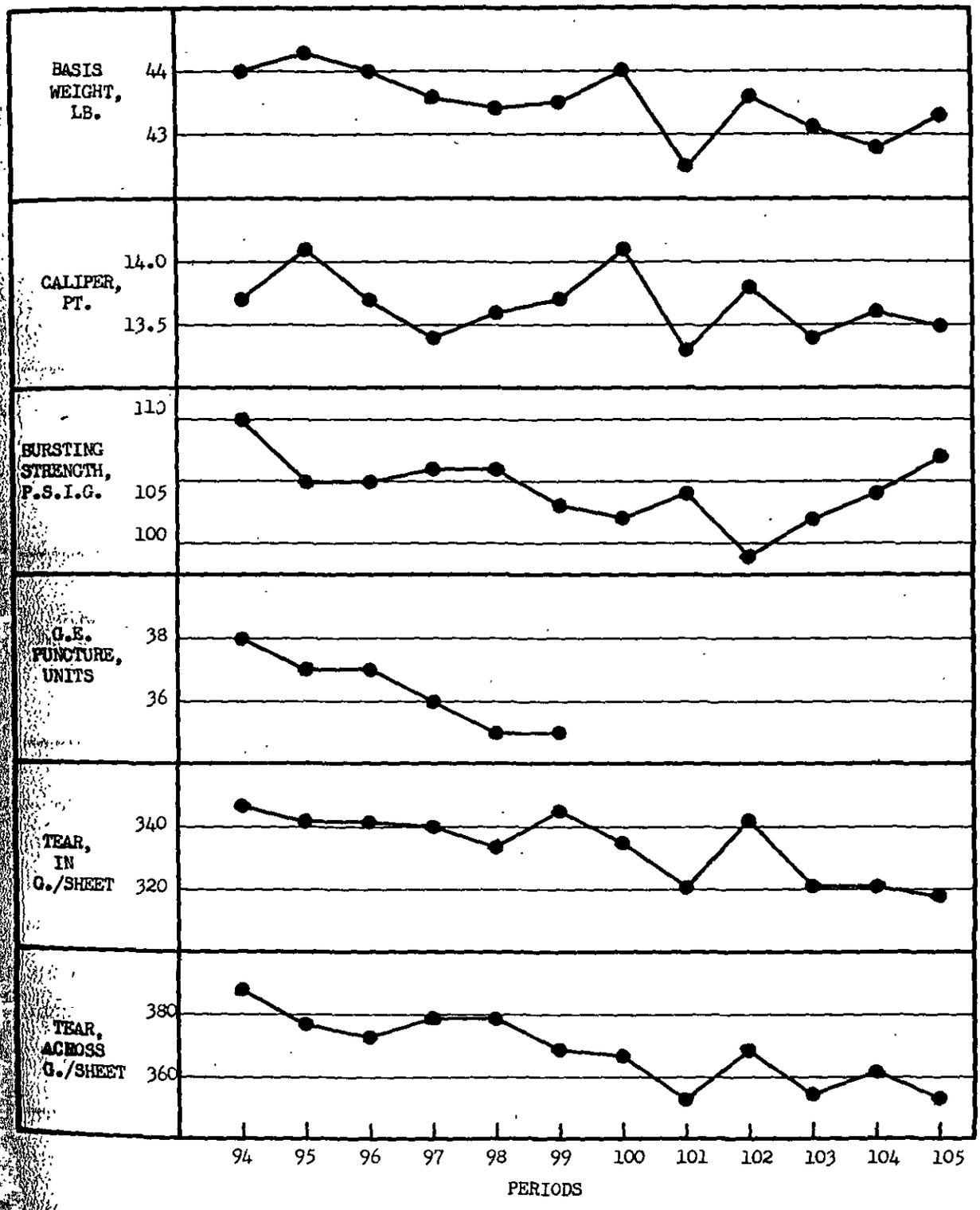


Figure 12

Comparison of Current Mill Average by Periods for Mill K

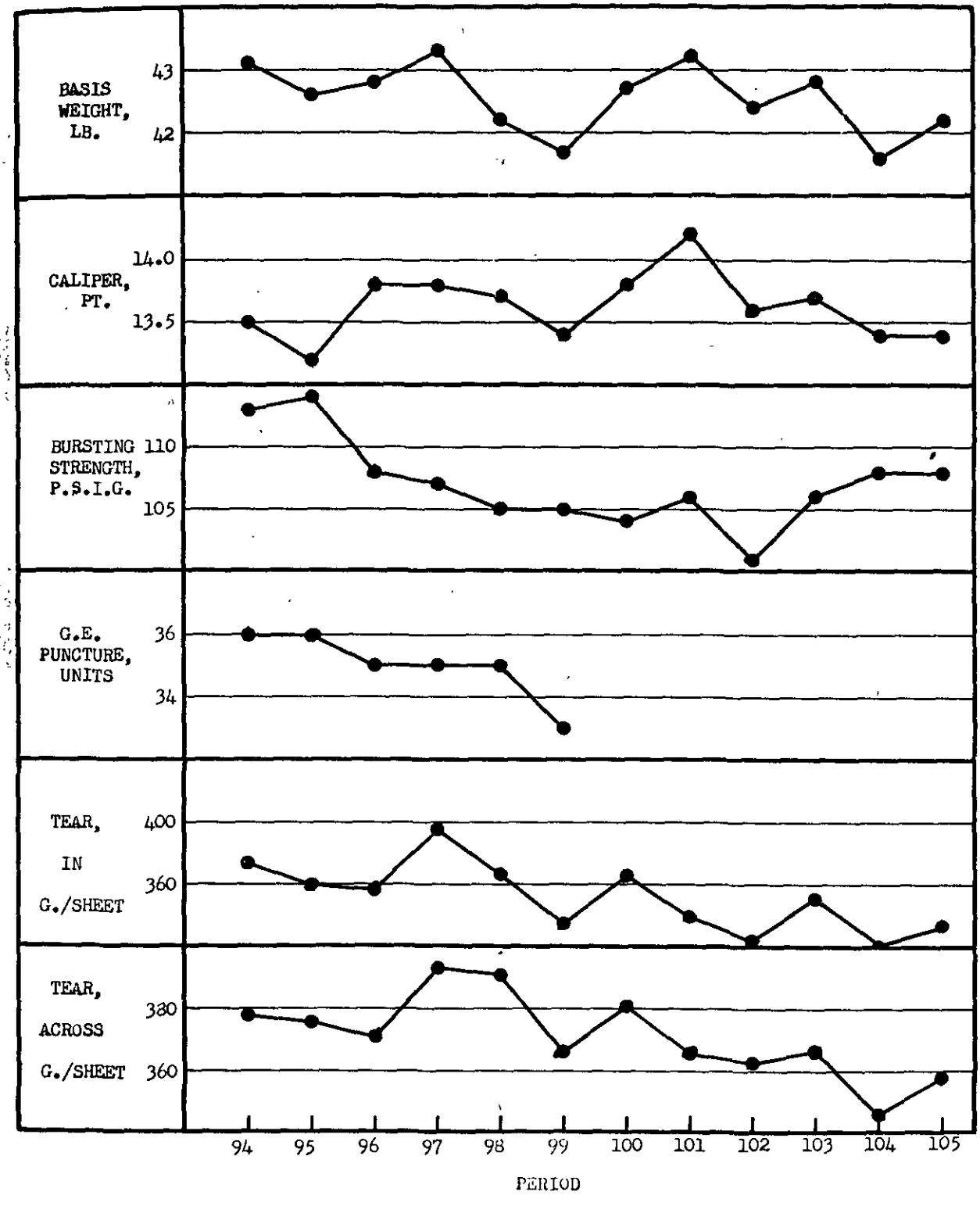


Figure 13

Comparison of Current Mill Average by Periods for Mill L

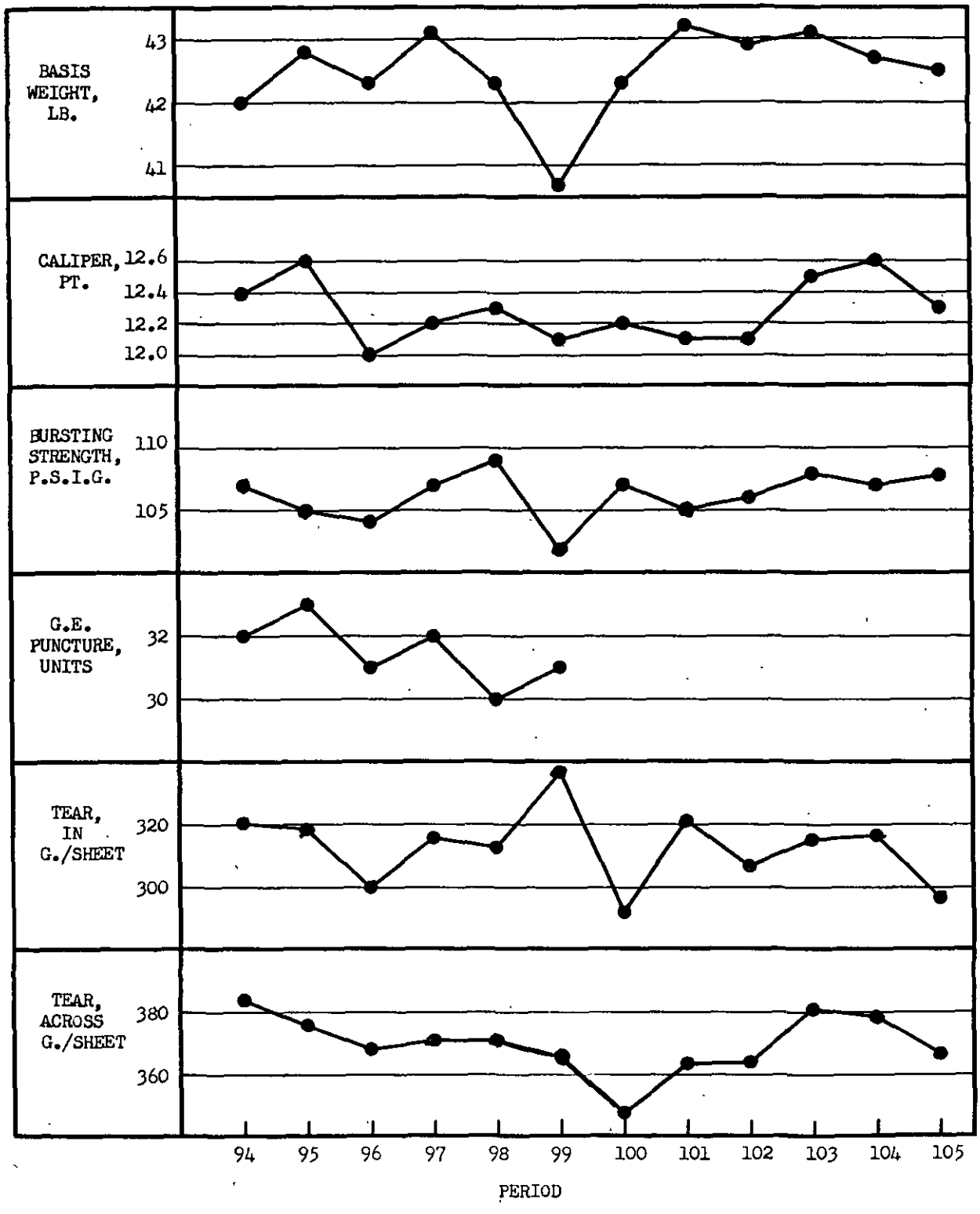


FIGURE 14

Comparison of Current Mill Averages by Periods for Mill M

have exhibited levels considerably lower than the F.K.I. averages for the machine direction and slightly lower for the cross-machine direction.

The current mill averages for Mill N are shown in Table XVII and presented graphically in Figure 15. It may be seen in Figure 15 that basis weight has varied between the 42.1 and 43.0 lb.; caliper has maintained a low level generally below 12 points but currently higher; bursting strength has maintained a strong level; G. E. puncture was maintaining a strong level when it was discontinued and the tearing strength results have exhibited values considerably stronger than the F.K.I. averages.

The current mill averages for Mill O are given in Table XVIII and pictorially illustrated in Figure 16 where it may be noted that basis weight has maintained a very low level generally near 42 lb.; caliper also has been very low, varying between 11.4 and 12.8 points but generally near 12 points; bursting strength has held a level between 104 and 116 p.s.i.g., while Elmendorf tear results have maintained levels generally in line with the F.K.I. averages and the G.E. puncture test was maintaining a high level of 39 units when discontinued at the conclusion of the 99th period.

The current mill averages for Mill P are shown in Table XIX and illustrated graphically in Figure 17. It may be noted in Table XIX that basis weight results have maintained a level near 43 lb. but currently are near 42 lb.; caliper results have exhibited a level slightly above 13 points; bursting strength exhibited a strong level slightly above 110 p.s.i. g. for the period of this report; G. E. puncture was maintaining a good level of

TABLE XVII

TABULATION OF CURRENT AVERAGES BY PERIODS FOR MILL N

Period	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. g.	G. E. Puncture, units	Elmendorf Tear, g./sheet In	Across
94	42.4	11.3	109	36	397	387
95	42.8	11.5	108	38	396	369
96	42.4	11.2	116	37	359	388
97	--	--	--	--	--	--
98	42.1	11.1	121	35	365	386
99	42.4	11.5	111	38	369	386
100	43.0	11.8	112		375	402
101	42.5	11.7	108		364	379
102	42.7	11.4	112		348	376
103	--	---	--		--	--
104	42.4	11.9	121		361	418
105	42.6	13.7	114		373	407

TABLE XVIII

TABULATION OF CURRENT AVERAGES BY PERIODS FOR MILL O

Period	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. g.	G. E. Puncture, units	Elmendorf Tear, g./sheet In	Across
94	41.8	11.5	112	39	352	385
95	41.7	11.4	107	37	368	379
96	41.7	11.9	104	39	346	400
97	42.2	11.8	110	40	368	409
98	42.2	11.7	109	37	362	394
99	41.9	12.0	109	39	352	393
100	41.7	12.0	105		347	385
101	42.3	12.0	108		358	384
102	42.7	12.4	107		362	393
103	42.4	12.5	110		357	409
104	42.6	12.8	107		378	418
105	42.3	12.0	116		352	388

TABLE XIX

TABULATION OF CURRENT AVERAGES BY PERIODS FOR MILL P

Period	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. g.	G. E. Puncture, units	Elmendorf Tear, g./sheet In	Across
94	43.4	13.6	110	37	338	382
95	43.0	13.6	111	37	351	396
96	42.5	13.5	111	35	334	370
97	42.5	12.8	111	33	328	367
98	42.5	13.3	110	34	346	377
99	43.2	13.1	112	36	345	380
100	43.0	13.4	106		339	382
101	43.1	13.1	111		339	378
102	43.2	13.5	111		343	378
103	42.6	13.0	111		331	375
104	42.7	13.2	112		330	375
105	42.4	13.3	114		338	371

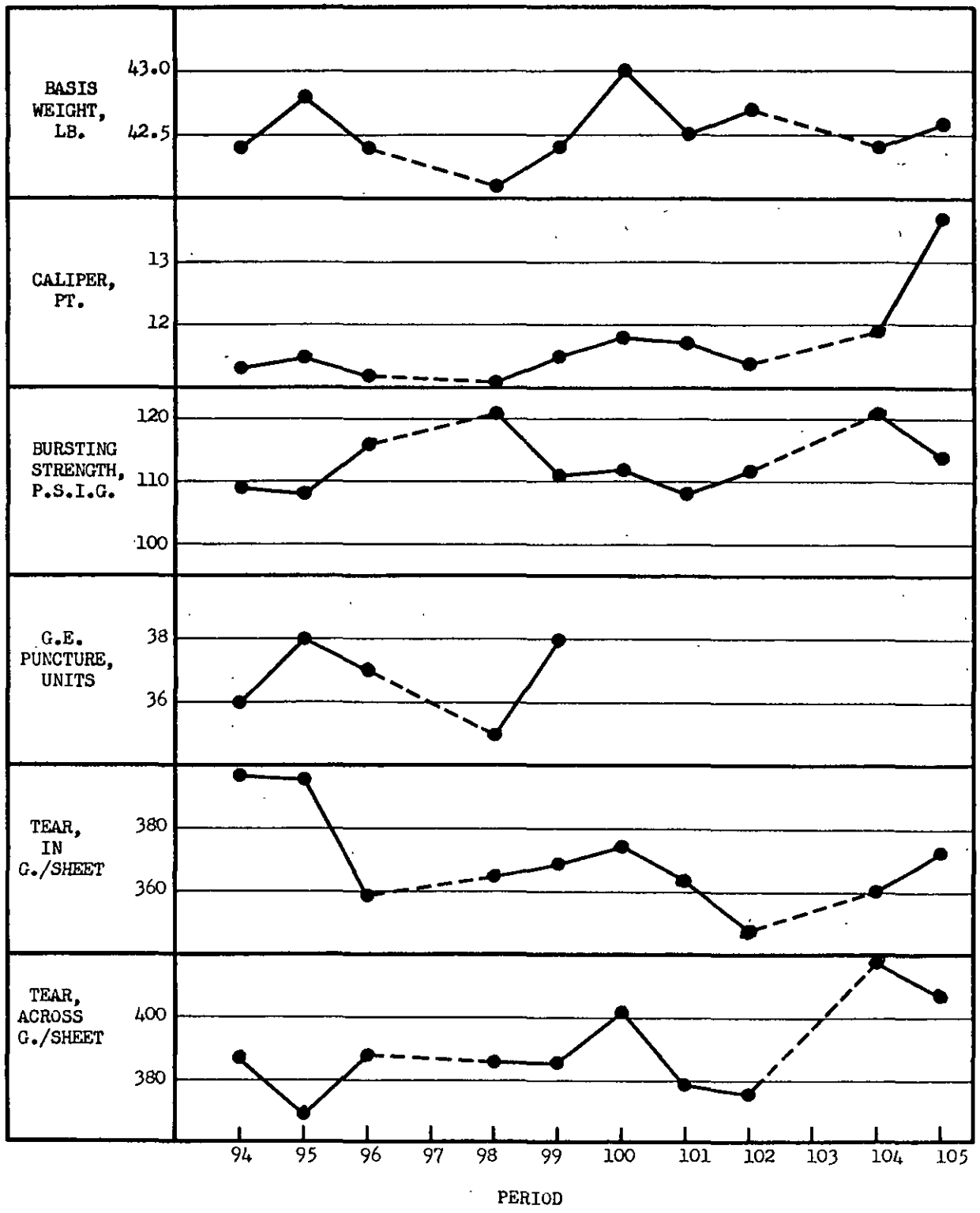


Figure 15

Comparison of Current Mill Averages by Periods for Mill N

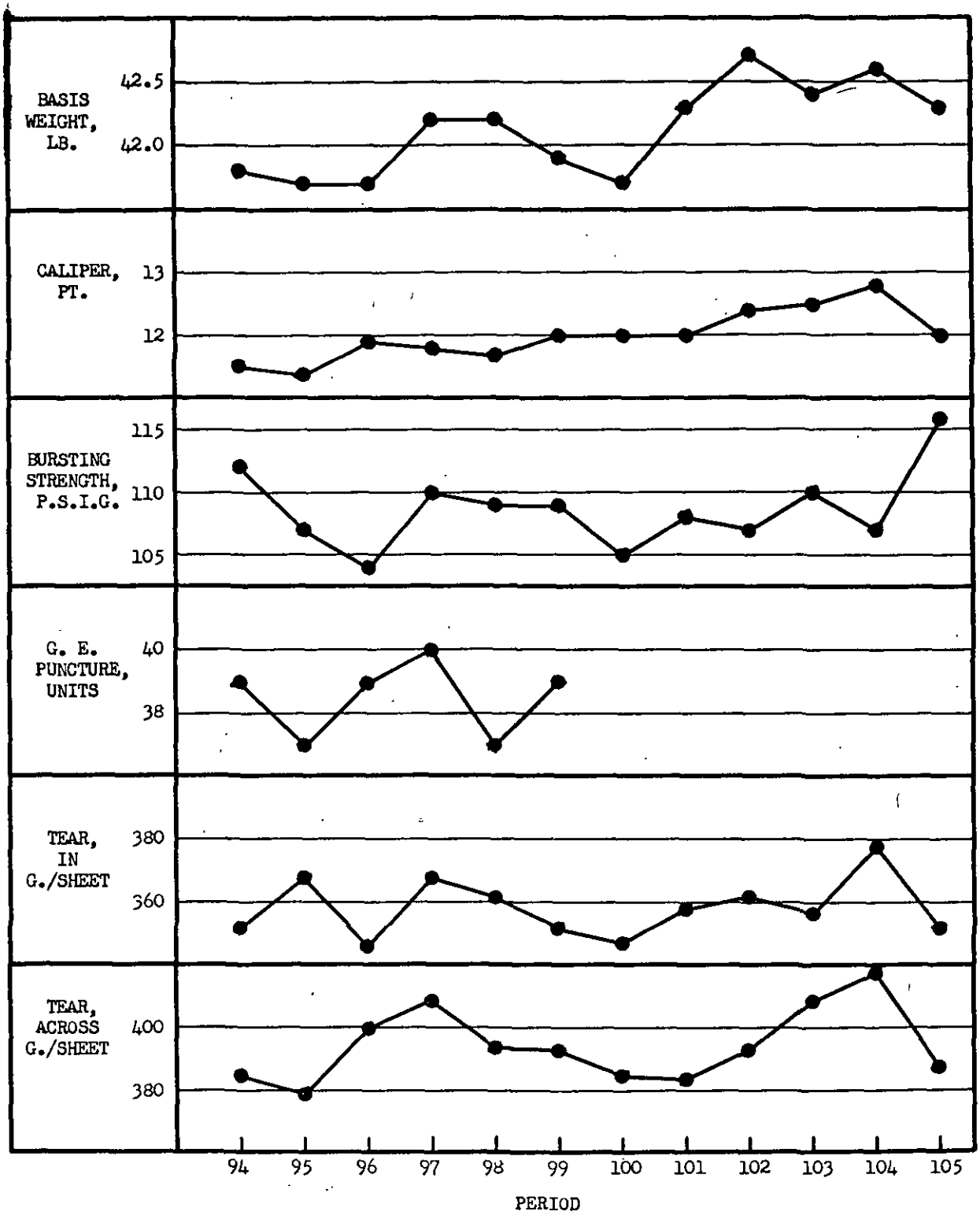


Figure 16

Comparison of Current Mill Averages by Periods for Mill 0

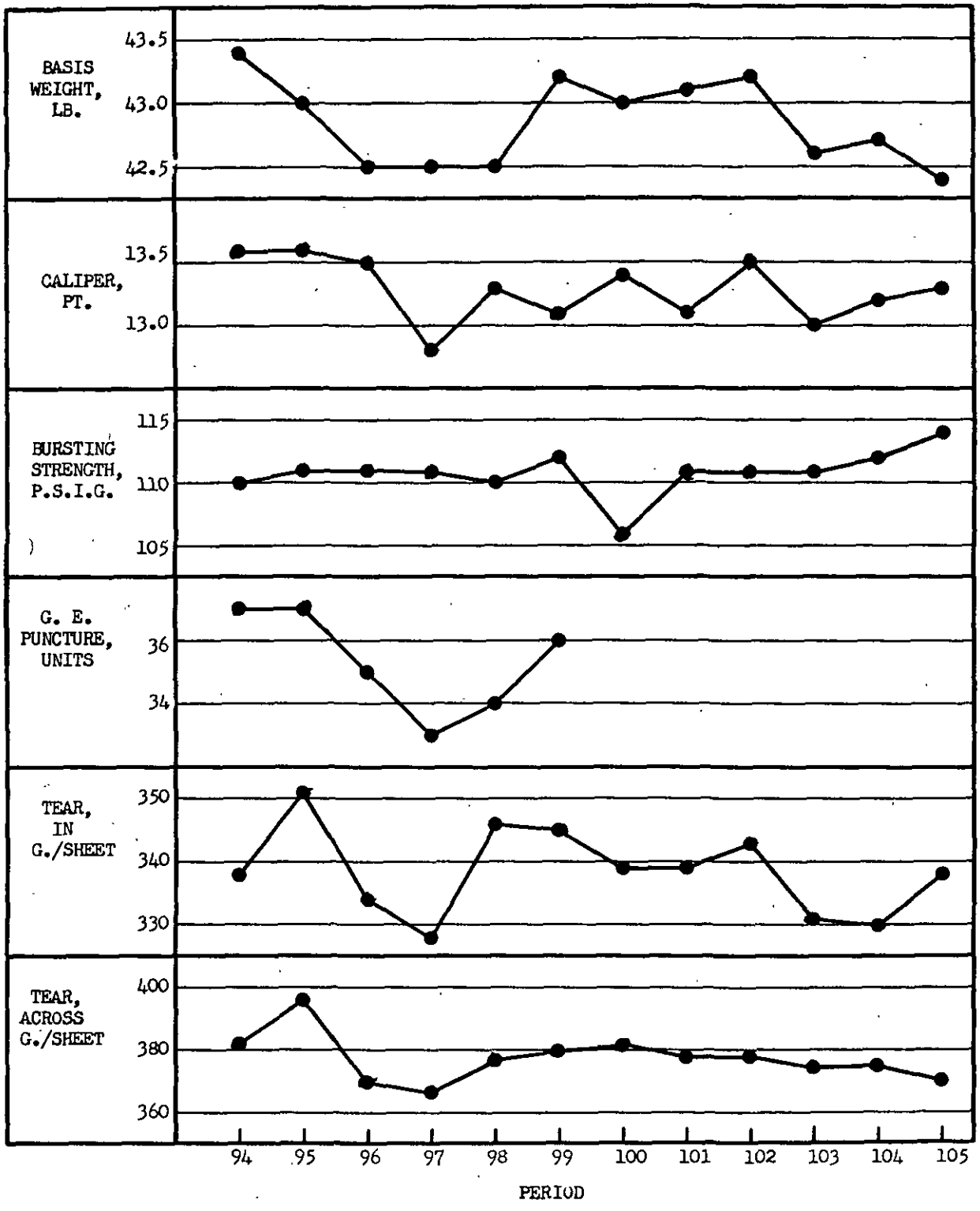


Figure 17

Comparison of Current Mill Averages by Periods for Mill P

36 units when it was discontinued; and tearing strength exhibited levels slightly below the F.K.I. averages.

The current mill averages for Mill Q are given in Table XX and presented graphically in Figure 18. It may be noted in Table XX that basis weight exhibited values near or slightly below 43 lb. for most of the twelve periods; caliper values were generally slightly above 12 points; bursting strength values ranged from a low of 103 to a high of 115 p.s.i.g.; G. E. puncture had declined from 36 units to a low of 32 units when discontinued; and Elmendorf tear results were generally higher than the F.K.I. averages.

The current mill averages (drum linerboard) for Mill E are given in Table XXI and illustrated graphically in Figure 19 where it may be noted that basis weight has varied between 45.9 and 48.6 lb. and caliper has maintained an average generally near 14 points. Bursting strength has been close to the 100 p.s.i.g. level, G. E. puncture generally above 40 units, tearing strength (machine direction) near 400 g./sheet and (cross-machine direction) also hear 400 g./sheet with a considerable variation in each case for some periods.

A composite summary of the current F.K.I. averages from the inception of the Continuous Baseline Study to the present time is given in Table XXII. These results are illustrated graphically in Figure 20. It may be noted in Figure 20 that basis weight has remained relatively constant, being near the 43-lb. level at all times. A very definite trend to lower caliper has been evident and, at the present time, caliper values have leveled off at slightly below 13 points. Bursting strength values for the one hundred and five periods have exhibited no constant long-range trend.

TABLE XX

TABULATION OF CURRENT AVERAGES BY PERIODS FOR MILL Q

Period	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. g.	G. E. Puncture, units	Elmendorf Tear, g./sheet In	Across
94	43.1	12.4	109	36	368	404
95	42.4	12.5	103	35	368	405
96	42.6	12.1	109	34	365	391
97	42.6	12.1	110	34	369	388
98	42.7	12.1	113	33	356	386
99	42.4	12.1	115	32	342	376
100	42.6	12.0	112		360	374
101	42.7	12.1	107		374	398
102	42.8	12.2	112		353	385
103	42.9	12.4	113		358	389
104	43.1	12.4	107		348	389
105	43.0	12.4	105		355	387

TABLE XXI

TABULATION OF CURRENT AVERAGES BY PERIODS FOR MILL R
(Drum Linerboard)

Period	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. g.	G. E. Puncture, units	Elmendorf Tear, g./sheet In	Across
94	47.6	14.3	100	43	398	411
95	47.4	14.3	100	42	408	403
96	47.1	14.1	108	41	392	410
97	--	--	--	--	--	--
98	46.6	13.8	97	40	372	401
99	48.6	15.6	113	43	405	425
100	45.9	13.8	100		374	399
101	--	--	--		--	--
102	46.7	14.4	88		409	374
103	47.4	14.1	94		353	372
104	46.8	14.3	104		405	426
105	47.0	14.3	97		384	369

TABLE XXII

TABULATION OF CURRENT F.K.I. AVERAGES BY PERIODS

Period	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. g.	G. E. Puncture, units	Elmendorf Tear, g./sheet In	Across
1	42.9	15.6	103	40	389	422
2	42.6	15.3	102	39	373	408
3	43.1	15.4	105	39	395	423
4	43.4	15.2	107	39	381	412
5	43.2	15.4	104	39	378	419
6	43.1	15.2	101	39	377	416
7	43.4	15.4	99	39	384	411
8	42.9	14.9	102	39	383	409
9	43.2	15.0	101	40	387	416
10	43.4	15.0	101	37	403	426
11	43.2	14.7	104	38	400	423
12	43.0	14.6	103	37	394	423
13	42.9	14.5	102	38	379	416
14	43.0	14.5	102	37	379	411
15	43.0	14.5	105	34	372	409
16	43.3	14.8	104	34	370	400
17	43.1	14.9	105	36	372	408
18	43.5	14.8	104	36	374	411
19	43.3	14.6	105	38	364	401
20	43.2	14.2	106	37	372	406
21	43.4	14.1	109	37	376	415
22	43.0	14.1	113	37	381	414
23	43.3	14.1	110	37	377	410
24	43.5	14.1	110	36	379	405
25	43.5	14.4	109	35	382	414
26	43.4	14.2	110	36	374	404
27	43.4	14.0	112	37	385	425
28	43.4	14.1	111	37	388	417
29	42.9	14.0	109	36	379	415
30	43.1	13.7	108	36	383	425
31	43.0	13.6	106	36	384	418
32	42.6	13.6	106	36	390	418
33	43.6	13.7	110	36	376	413
34	43.5	13.5	110	36	379	410
35	43.3	13.4	109	36	374	414
36	43.2	13.4	110	36	372	411
37	43.3	13.7	107	35	379	412
38	43.0	13.7	106	35	372	411
39	42.9	13.6	105	35	369	402
40	42.9	13.8	104	36	379	412

TABLE XXII--Continued

TABULATION OF CURRENT F.K.I. AVERAGES BY PERIODS

Period	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. g.	G. E. Puncture, units	Elmendorf Tear, g./sheet In	Across
41	42.9	13.4	102	34	371	403
42	42.9	13.3	102	35	374	408
43	42.6	13.4	102	36	373	401
44	42.5	13.4	104	35	357	390
45	42.7	13.3	105	35	362	395
46	42.4	13.2	105	35	359	393
47	42.6	13.4	104	35	365	399
48	42.6	13.3	103	36	367	397
49	42.8	13.3	104	35	362	397
50	42.9	13.2	108	35	362	389
51	42.8	13.3	106	35	363	393
52	42.9	13.2	106	36	367	395
53	42.9	13.2	109	34	357	391
54	43.2	13.4	106	36	362	398
55	42.9	13.4	106	35	365	398
56	43.0	13.4	108	36	358	394
57	43.1	13.3	107	35	359	388
58	42.7	13.3	108	35	348	382
59	42.9	13.4	109	35	354	390
60	43.1	13.3	107	34	360	388
61	43.3	13.4	108	35	363	400
62	43.2	13.3	109	34	364	390
63	43.1	13.5	107	34	356	390
64	42.9	13.5	107	34	353	391
65	42.9	13.4	108	35	364	400
66	43.0	13.2	108	34	360	394
67	43.0	13.1	108	34	353	390
68	42.9	13.3	109	34	350	388
69	43.0	13.2	110	35	363	397
70	43.0	13.4	108	34	358	390
71	43.2	13.4	110	35	364	399
72	43.0	13.1	108	33	351	387
73	42.9	12.9	111	33	349	385
74	43.1	13.0	110	33	347	382
75	42.7	12.8	112	33	341	374
76	43.0	13.2	107	33	342	375
77	42.9	13.0	109	33	347	380
78	43.4	13.1	109	33	353	387
79	43.0	13.0	108	34	351	384
80	43.1	13.0	108	35	348	384

TABLE XXII--Continued

TABULATION OF CURRENT F.K.I. AVERAGES BY PERIODS

Period	Basis Weight, lb.	Caliper, points	Bursting Strength, p.s.i. g.	G. E. Puncture, units	Elmendorf Tear, g./sheet In	Elmendorf Tear, g./sheet Across
81	42.9	13.0	110	34	356	389
82	43.0	12.9	109	34	354	383
83	43.0	13.1	111	34	351	381
84	42.7	12.9	111	33	344	377
85	43.1	12.9	114	34	352	383
86	42.9	12.8	112	34	351	378
87	42.9	12.8	112	34	347	379
88	43.1	13.0	111	35	355	382
89	43.0	13.1	109	36	361	389
90	43.4	13.0	110	37	355	384
91	42.9	12.9	111	36	355	384
92	43.2	13.0	110	35	347	377
93	43.3	13.0	112	37	358	387
94	43.0	12.8	111	36	360	387
95	42.9	12.7	110	36	362	387
96	42.8	12.6	108	35	351	383
97	43.0	12.7	109	35	358	388
98	42.8	12.7	111	35	353	385
99	42.7	12.6	109	35	352	381
100	43.0	12.7	108		352	382
101	43.0	12.7	108		352	383
102	43.0	12.6	109		345	379
103	43.0	12.8	109		342	379
104	42.8	12.8	109		345	382
105	42.8	12.8	110		347	379

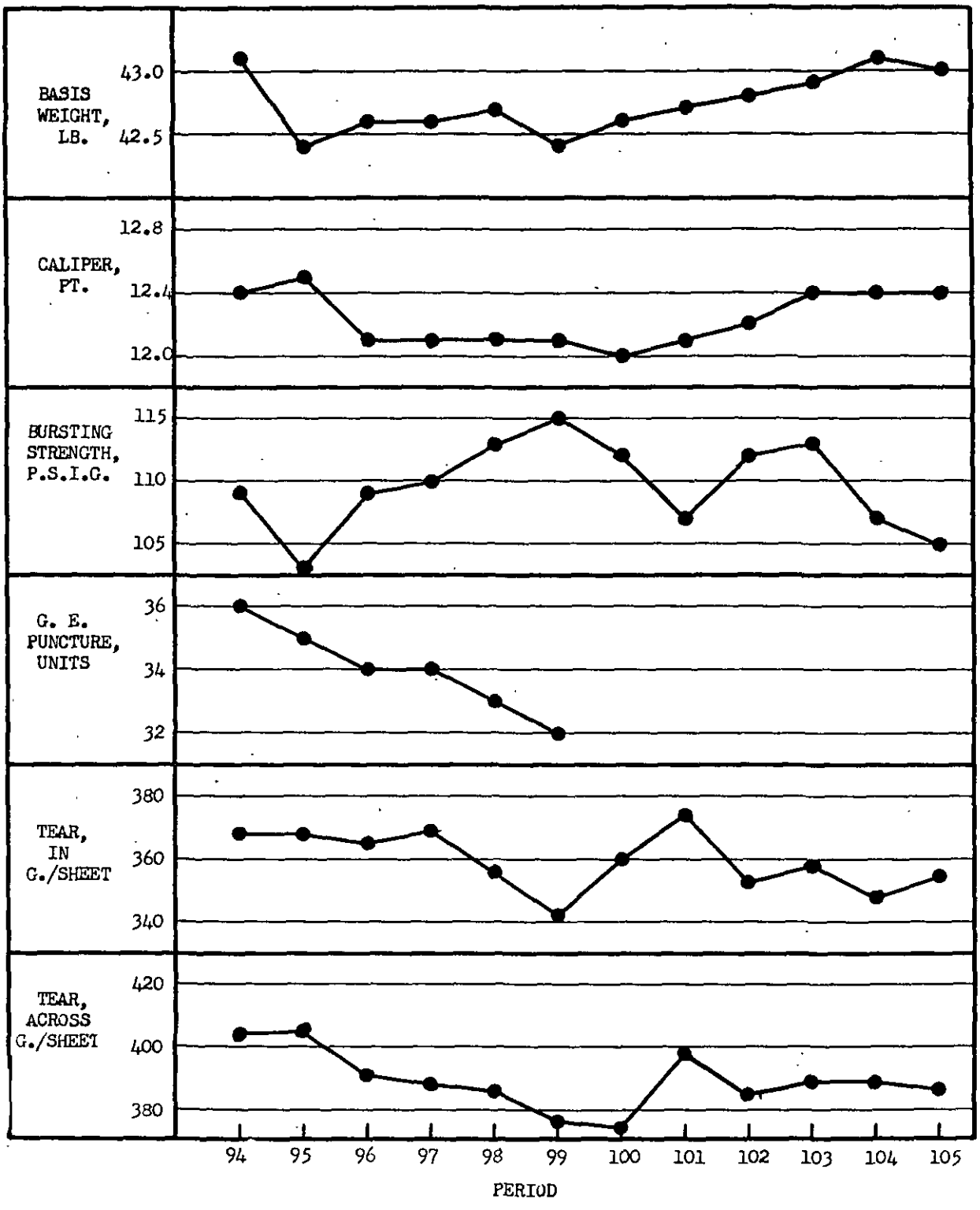


Figure 18

Comparison of Current Mill Averages by Periods for Mill Q

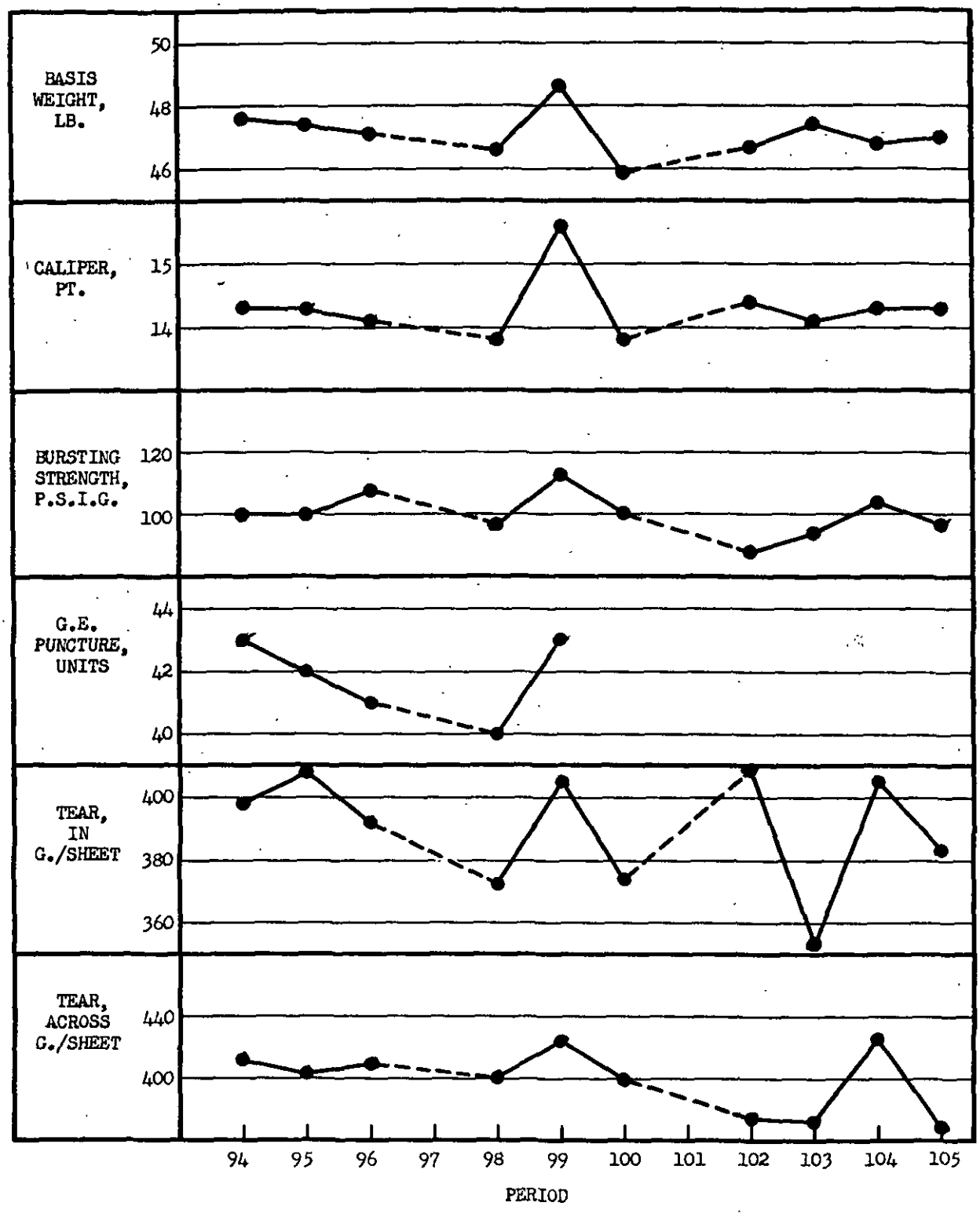
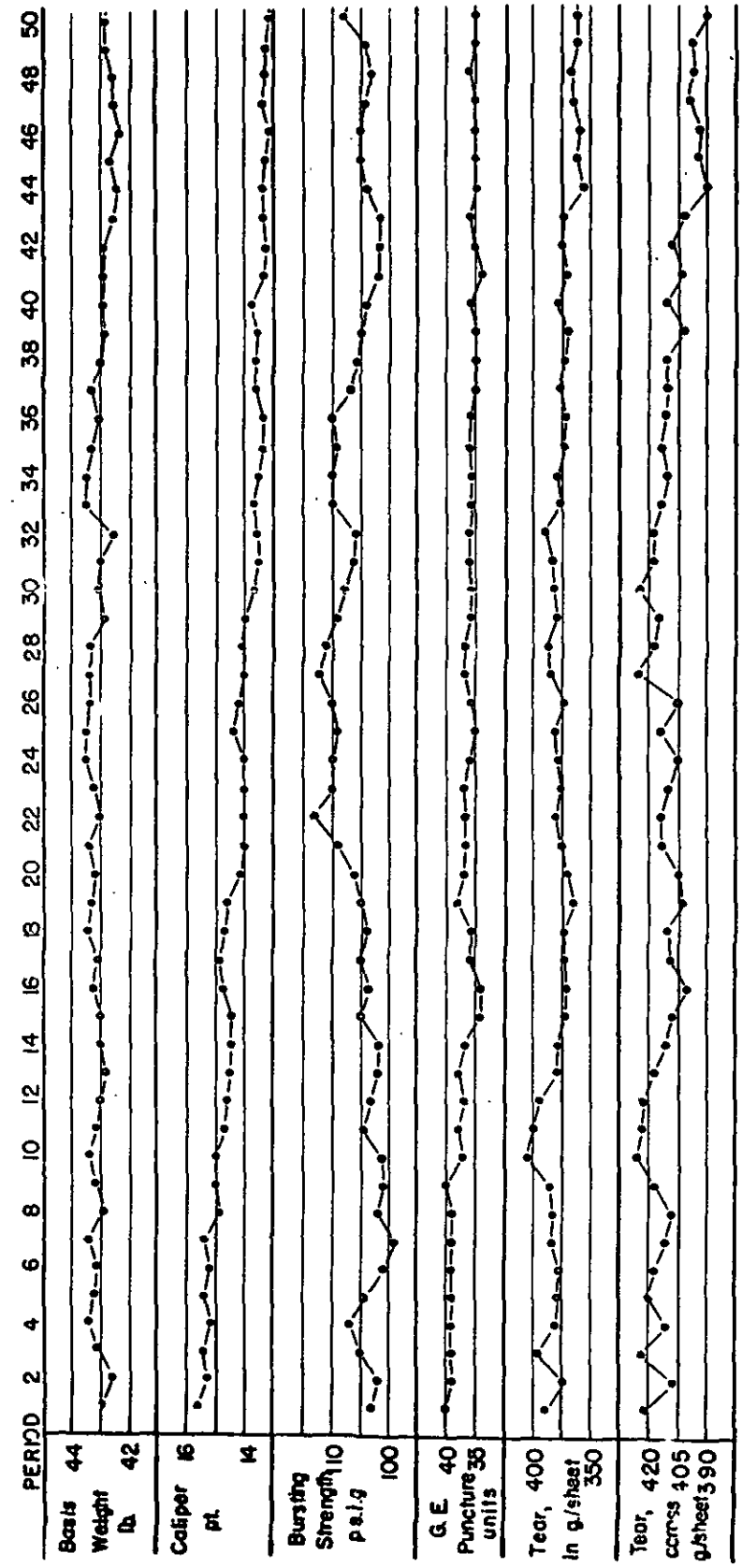
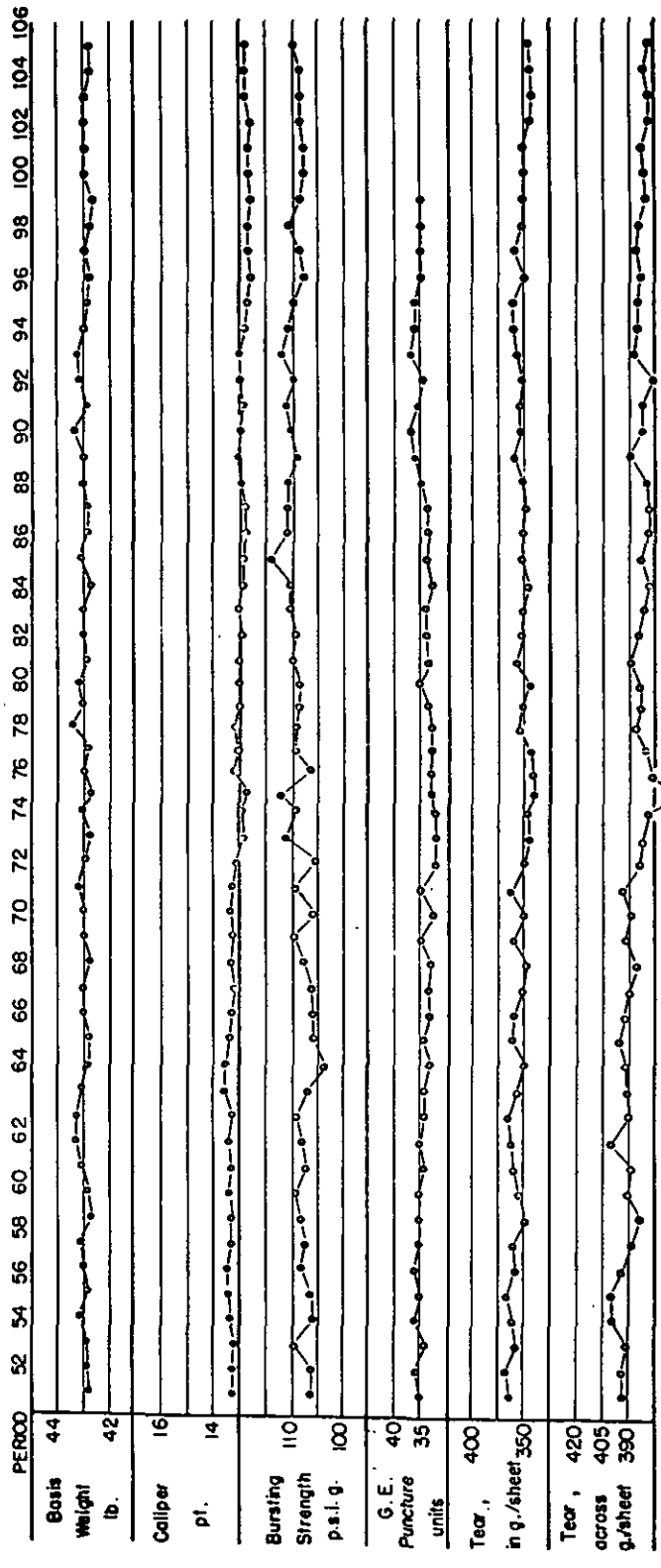


Figure 19

Comparison of Current Mill Average by Periods for Mill R
(Drum Linerboard)



COMPARISON OF CURRENT F.K.I. AVERAGES BY PERIODS



COMPARISON OF CURRENT F.K.I. AVERAGES BY PERIODS

During the first thirty-six periods, bursting strength showed an upward trend; then, to period forty-three, a downward trend. Since then, the bursting strength has maintained a high level near 110 p.s.i. g. G. E. puncture values have exhibited a gradual decline but appeared to be gaining strength when the test was discontinued at the conclusion of period 99. The machine and cross-machine direction tearing strength values have also gradually declined since the study was initiated. Thus, briefly summarized, the trends for the one hundred and five periods have been the following:

1. Weight has remained relatively constant at approximately 43 lb.

2. Caliper has decreased from a high level of nearly 16 points and leveled off at slightly below 13 points.

3. Bursting strength has exhibited upward and downward trends, and is currently maintaining a high level near 110 p.s.i.g.

4. G. E. puncture has gradually declined from a high of 40 units for the first period to a low of 33 units for the 72nd to 78th periods but appeared to be regaining strength when the test was discontinued at the conclusion of the 99th period.

5. Machine direction tearing strength has declined from 400 g./sheet at the start of the program to about 350 g./sheet currently.

6. Cross-machine direction tearing strength has slowly declined from a high value of more than 420 g./sheet at the inception of the study to approximately 380 g./sheet at the present time.